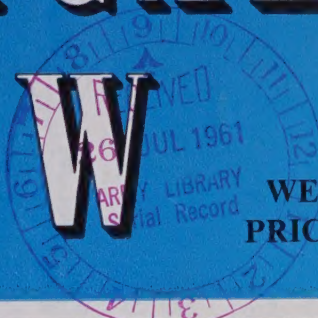


ELECTRICAL REVIEW

FRIDAY
7 JULY 1961

WEEKLY
PRICE 1s 6d



Aberdare cables

every inch as good as every other inch

ABERDARE CABLES LIMITED · ABERDARE GLAMORGAN
London Office: 19 Woburn Place London W.C.1 TERMINUS 2777

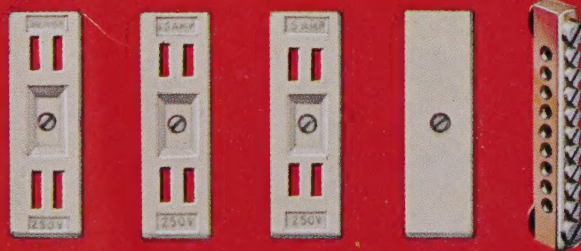
MEMERA the unit which set a new high standard in the industry



If the job calls for unusual fuse combinations, it's no trouble at all with Memera. No other equipment gives you the same versatility as Memera. The system is so delightfully simple. The chassis is the same for all combinations. Just fit the appropriate shields to suit the fuse ratings you need for the job. Once these are fitted, only the correctly rated fuse handles can be inserted. And of course with Memera there is the big advantage that you can use either rewirable or H.R.C. fuses.

TAKE THE STANDARD CHASSIS

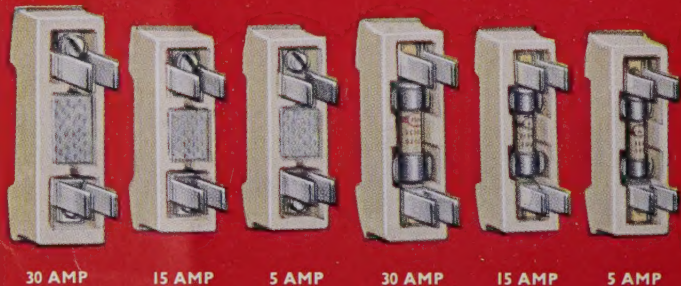
FIT THE SHIELD RATINGS YOU REQUIRE



ONLY THE RIGHT FUSE HANDLE RATINGS
WILL THEN FIT

REWIRABLE

OR H.R.C.



30 AMP

15 AMP

5 AMP

30 AMP

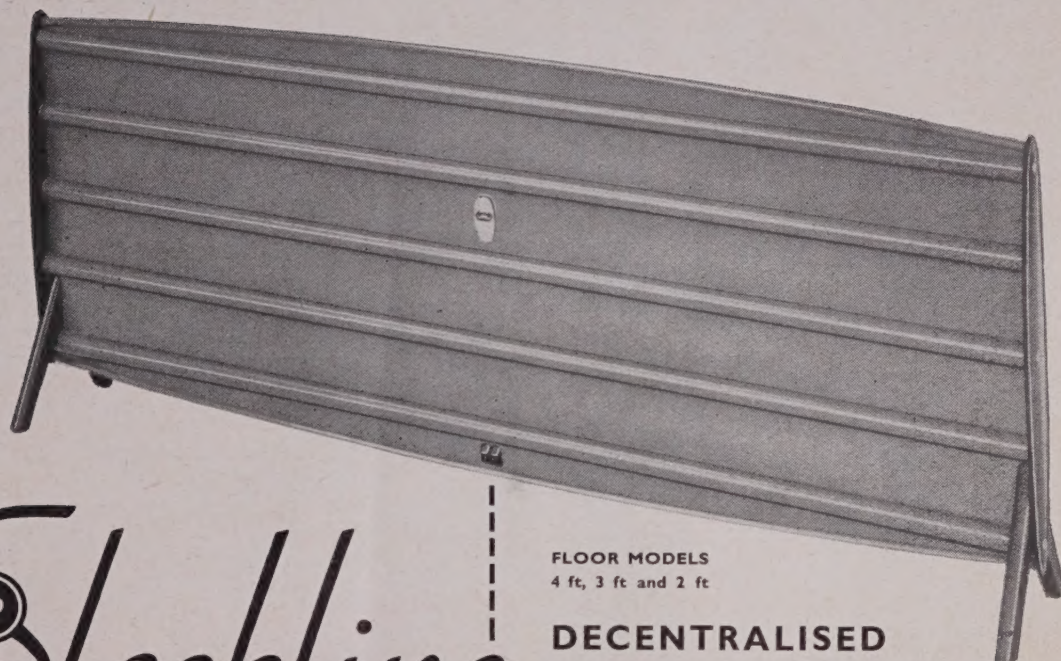
15 AMP


5 AMP



MIDLAND ELECTRIC MANUFACTURING CO. LTD • TYSELEY • BIRMINGHAM 11

BACKGROUND HEATING ON A BUDGET BASIS

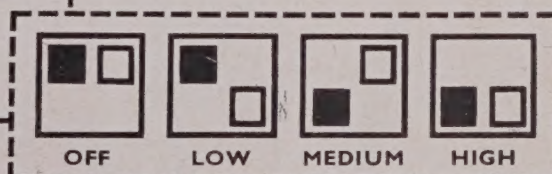



Sleekline

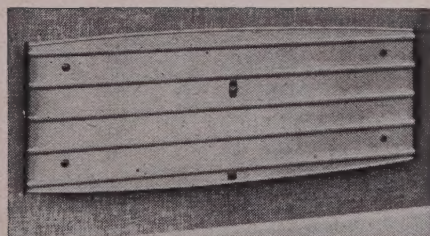
FLOOR MODELS
4 ft, 3 ft and 2 ft

DECENTRALISED
ELECTRIC
HEATING UNITS

with Personal Heat Control



Here is the central heating system that can be installed in any home, new or old, with little or no installation costs—and it's a system that can be added to from time to time as required. What is more it can be removed from home to home.



WALL MOUNTING UNITS

4 ft, 3 ft and 2 ft

The simple fixing of wall mounted units enables them to be removed in a few seconds when re-decorating or spring cleaning. They can be installed with room-thermostat control.

LOADINGS

4 ft. . . . 800 watts
3 ft. . . . 600 watts
2 ft. . . . 400 watts

HEATRAE LTD.

NORWICH • NORFOLK • NOR 29A • ENGLAND

Telephone: Norwich 23193 (Private Exch.) Telegrams: HEATRAE, NORWICH

Write for Leaflet No. 103

CIRCULATION COPY 1



Test for dependability

Exhaustive works testing at every stage of manufacture ensures the safe and efficient dependability of SANDERS Switchgear, renowned for superb performance and lasting reliability. Excellence of design, high quality finish and the embodiment in every Sanders product of years of specialised experience are not enough. Every SANDERS Unit must pass the most stringent works tests with a comfortable margin. This way you can be sure — as we are — that SANDERS Switchgear will survive the most rigid of all tests for dependability, that of continuous loading in daily use. Space-saving compactness, simplicity, ease of wiring and installation and complete dependability are your guarantee that

SANDERS SWITCHGEAR IS RIGHT IN EVERY ASPECT

SANDERS

something's cooking!...

Something's always cooking at DELANCO. They are always trying to improve on perfection.

On this occasion they are investigating a complaint regarding the canteen tea, but this same team of Delanco experts are more seriously engaged most of the time in improving the performance and quality of Delanco brand insulation materials for the electrical and engineering industries.

Considering the wide range of Delanco products and the constant demand for something super-plus in performance, it is astonishing how often they come up with the answer.

If your problem is connected in any way with electrical insulation—Bakelite Tubes; Sleeveings; Tapes; Machined, Pressed and Formed Components—just ring us, or write and our technical staff will go into action. Materials used under the Delanco trade mark are *Bakelite* · *Vulcanized Fibre* · *Leatheroid* · *Presspahn* · *Glass Fibre* · *Copper Clad Bakelite* and, of course, *Delanco Mica*.



DEPENDABLE

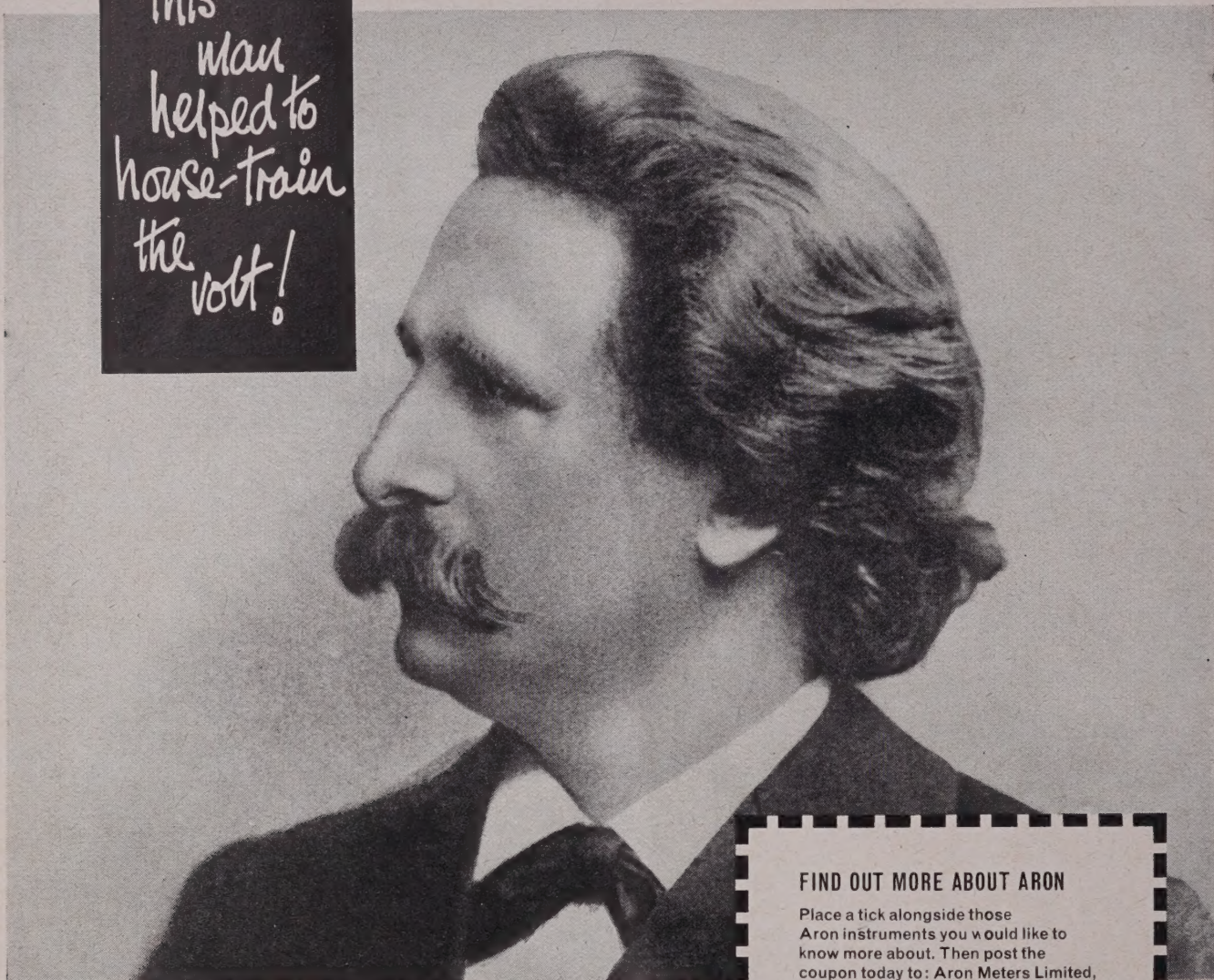
Delanco

for Electrical Insulation

Anglo-American Vulcanized Fibre Co. Ltd.,
Cayton Works, Bath Street, London, E.C.1.
CLE 8484. Grams: Prompserv, Cent, London.
Delanco Works, Leonard St., London, E.C.2.



this
man
helped to
house-train
the
volt!



Before 1883, electricity was not a commodity that could be sold with ease. There were no stations to make it, no grids to carry it, no satisfactory way of measuring consumption. Then Professor Aron took the principles of electro-magnetism and turned them into the first commercially successful 'clock' meter—a design so good that it was to remain unchallenged during many decades of subsequent development. Today, the pioneering spirit that helped to set the volt to work for everyone is still at home at Aron. Leaders still in the manufacture of electricity meters, this Company's energies are devoted to the development of new instruments and the improvement of existing ones; building into them all a lasting fitness for every job they have to do.

New Aron products will be announced during the next few months.

FIND OUT MORE ABOUT ARON

Place a tick alongside those Aron instruments you would like to know more about. Then post the coupon today to: Aron Meters Limited, 72-82 Salusbury Road, Kilburn, London NW6. Tel. Maida Vale 0182

House Service Credit Meters
Polyphase Meters
House Service Prepayment Meters
Maximum Demand Indicators
Voltage Range Indicators
Current, Watt Indicators
Voltage, Current, Watt Sensitive Relays
Summation Equipment
Prepayment Timer
Process Timer
Testing Equipment

NAME.....

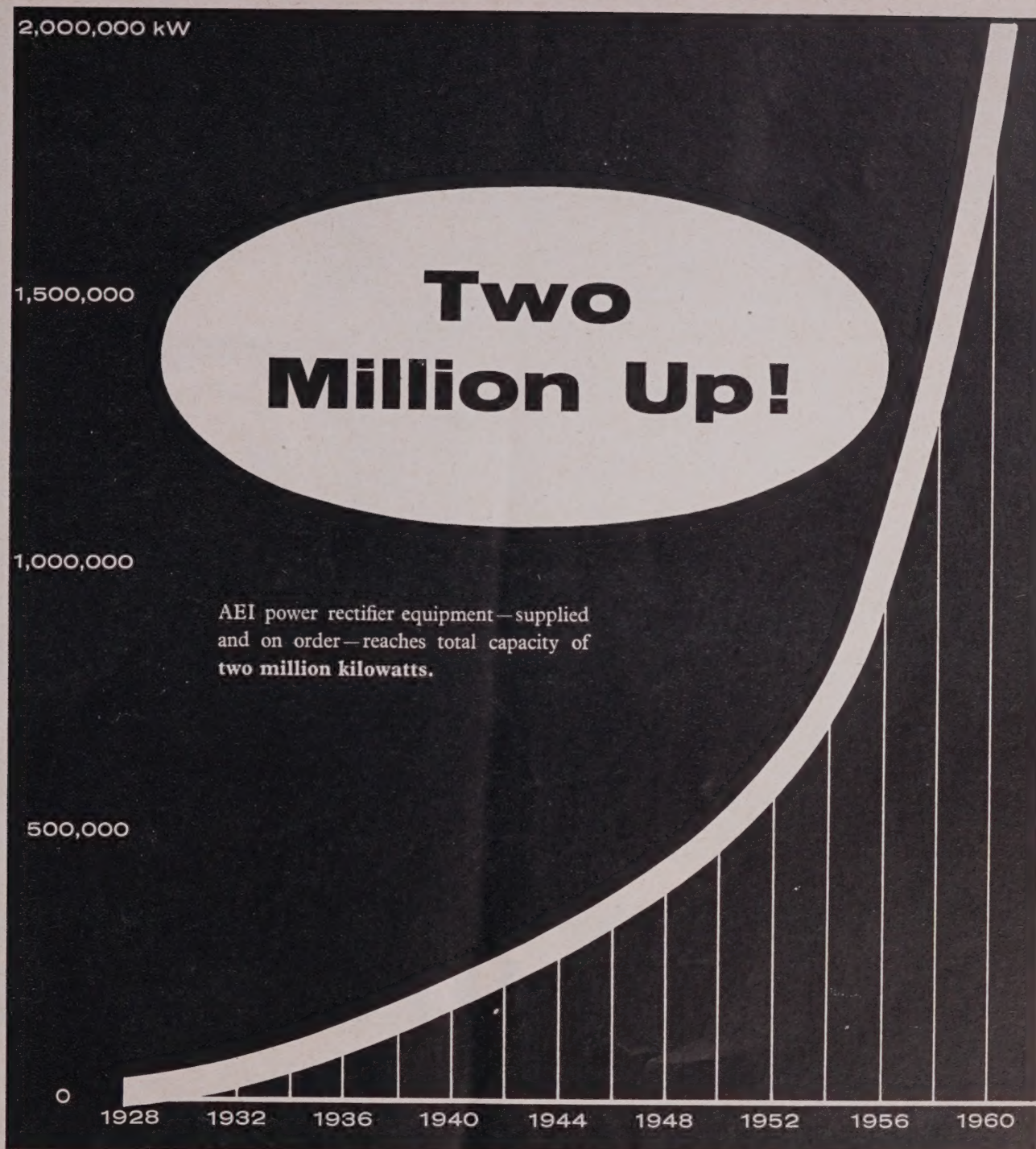
COMPANY.....

ADDRESS.....

.....



Aron the meter makers



FOR POWER RECTIFIERS—TALK TO AEI

In research, design, manufacture, and application of power rectifier equipment AEI has won and maintained a leading position. As manufacturers of mercury-arc, semiconductor, and valve-type rectifiers AEI can

provide precisely the right equipment for any application, be it a rolling mill drive or an arc furnace, an electro-chemical plant or a traction system, a mine-winder drive or a straightforward industrial D.C. supply.

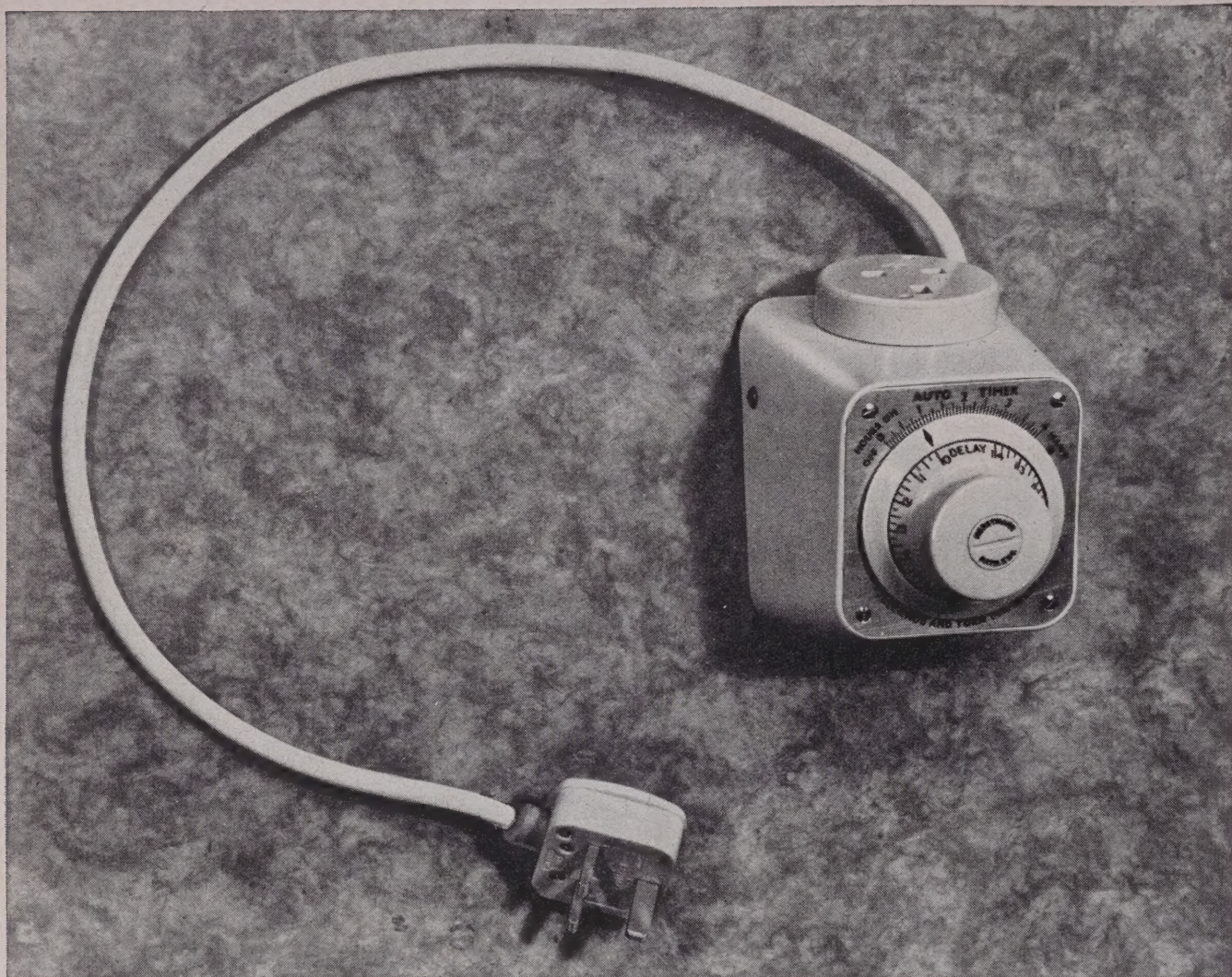


Associated Electrical Industries Limited

Heavy Plant Division

RUGBY, ENGLAND

A5642



Control your electrical appliances automatically with the Horstmann **AUTO TIMER**

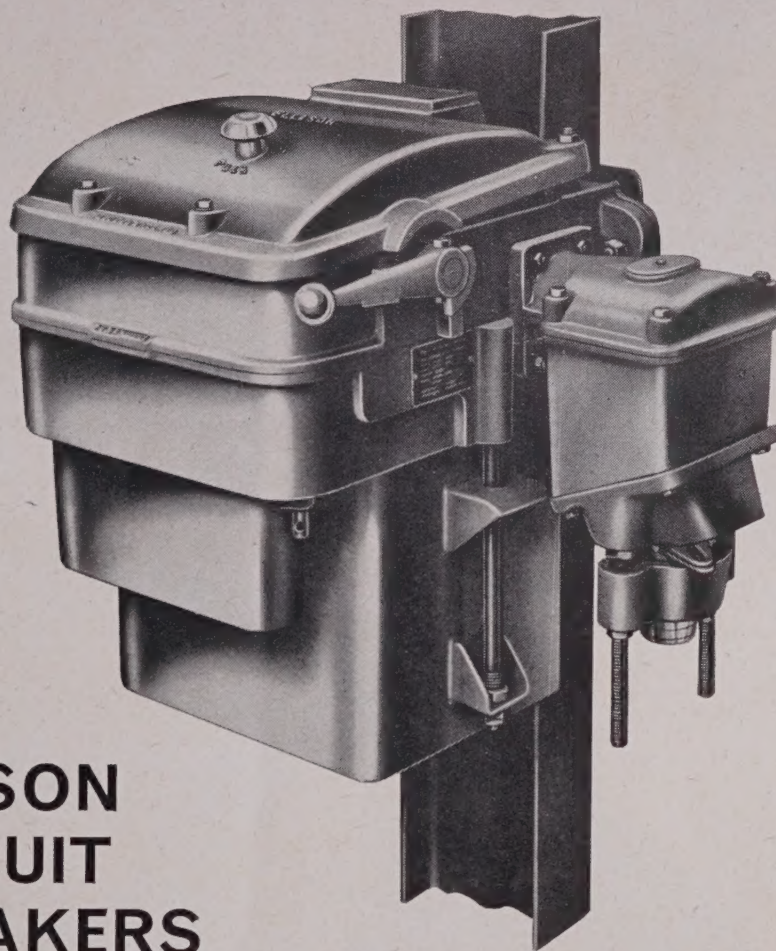
The Horstmann Auto Timer provides completely automatic control for small electric cookers (which are not available with built-in timers), convection heaters, electric fires and blankets, radio and TV sets, water heaters, greenhouse and soil heaters, outside and hall lights, etc. Plugged into any convenient point it will switch the appliance ON for any period up to four hours. Operation can be delayed for any period up to fourteen hours.

OPERATION The single control knob is turned until the pointer indicates on the scale (calibrated in 5 minute intervals) the 'ON' period desired. To delay this operation the control knob is pulled out and turned until the pointer shows the delay required on the 'delay' scale (calibrated in quarter hour intervals).

Send for a descriptive leaflet

HORSTMANN

THE HORSTMANN GEAR COMPANY LTD.
NEWBRIDGE WORKS, BATH Tel: 7241



ELLISON CIRCUIT BREAKERS

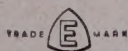
the best insurance premium you ever paid

When you invest in an Ellison Circuit Breaker you are, in fact, paying a premium for long-term insurance—insurance against breakdown, disruption of production, increased costs, unfulfilled orders. A premium for complete protection of operator and plant and trouble-free service over the years.

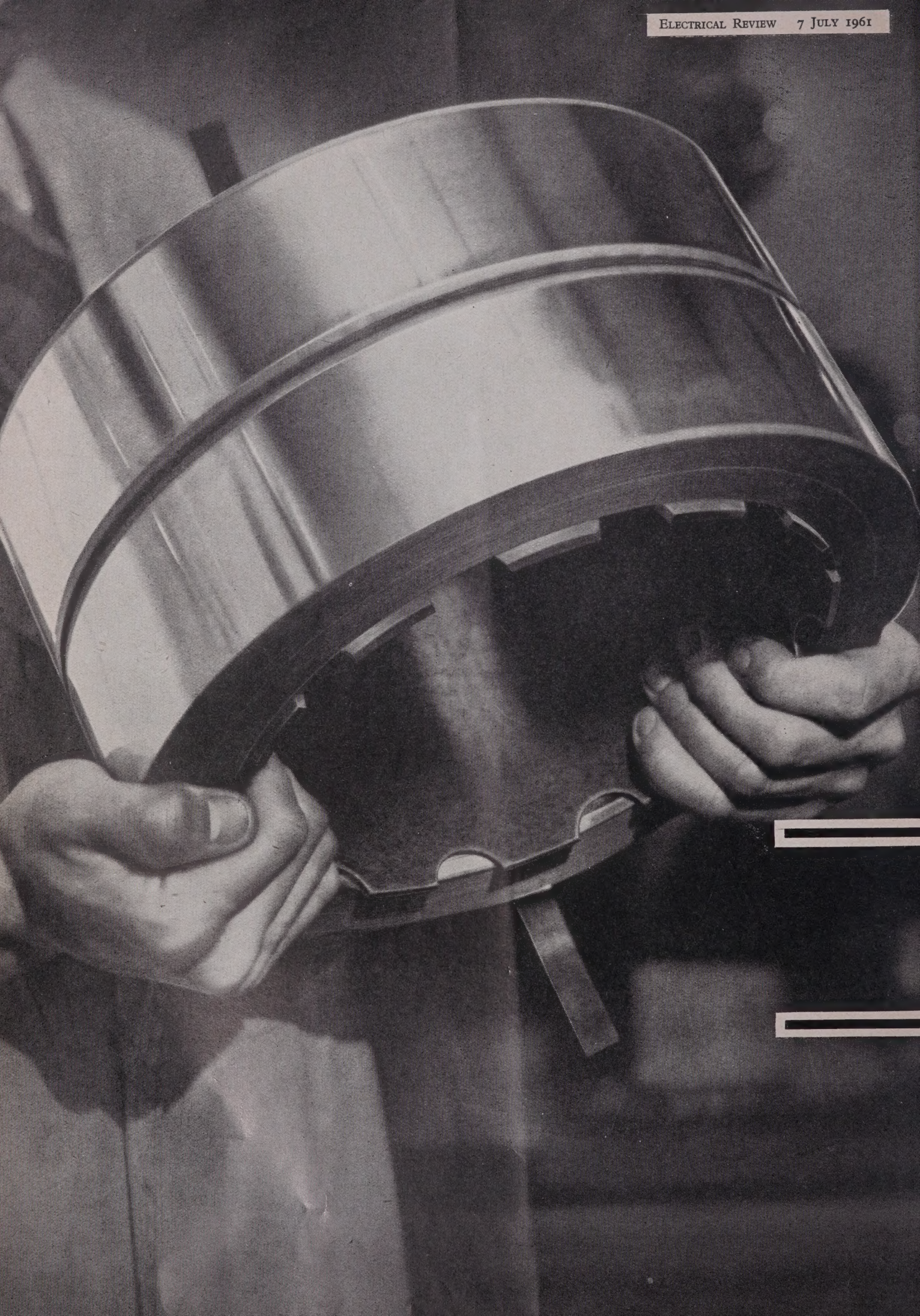
The traditional skill of Ellison craftsmen allied to advanced design assures you of this. Modern production methods ensure speedy delivery.

Ellison Circuit Breakers may cost a little more but it is equipment which depreciates only in your balance sheet!

GEORGE ELLISON LIMITED



PERRY BARR • BIRMINGHAM 22B

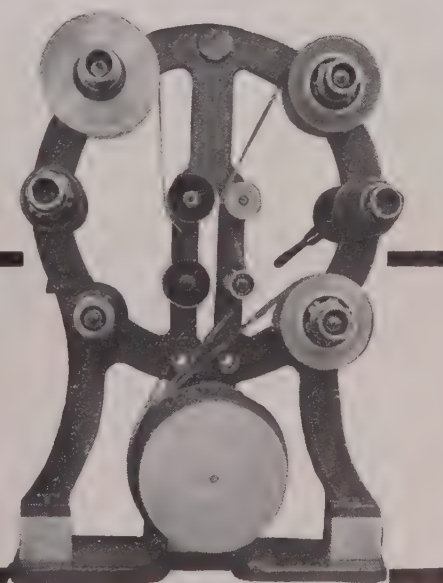


This transformer coil costs less, weighs only half as much— it's wound with **aluminium strip**

Coils wound with aluminium strip not only have better electrical and thermal characteristics: they are simple to make and show appreciable savings in material costs. Because they have none of the air spaces unavoidable with round wire, they are generally no larger than wire-wound coils of equal power and weigh only half as much. If you would like to know more about strip windings, or other uses of aluminium in the electrical industry, get in touch with any of the Alcan Industries' offices listed below.

SIMPLE TO MAKE

The winding technique is very simple, needing no costly winding equipment with traversing gear. The coils can be wound on to their cylindrical formers without flanged bobbins. Service and advice are freely available to firms interested in strip winding techniques.



ALCAN INDUSTRIES LTD

A member of the ALUMINIUM LIMITED OF CANADA group of companies

FORMERLY NORTHERN ALUMINIUM CO. LTD

Makers of Noral Alloys

Sales Offices: **BELFAST**: Donegall House, 7 Howard Street, Belfast 32805 • **BIRMINGHAM**: Devonshire House, Great Charles Street 3, Central 7393 • **BRISTOL**: Pelouquin Chambers, 18 St. Augustine's Parade 1, Bristol 20351 • **GLASGOW**: 73 Helen Street, Govan, SW1, Govan 3693
LEEDS: 26-27 Park Row 1, Leeds 33621 • **LONDON**: 50 Eastbourne Terrace W2, Paddington 3281
LUTON: 57 Bute Street, Luton 7364-5 • **MANCHESTER**: 23 Princess Street 2, Central 9335
NEWCASTLE UPON TYNE: Groat House, Collingwood Street 1, Newcastle 20878 • **Castings & Forgings Sales Division**: Middlemore Road, Handsworth, Birmingham, Northern 3671.





Photograph by permission of BALDWIN & FRANCIS LTD.



Castle LEATHEROID

complies with BSS.2768.1956 and is specially manufactured to meet the standards required by the Electrical Industry.

FOR SLOT CLOSURES

Vulcanised Fibre Ltd

BROADFORD MILLS, GUILDFORD, SURREY

Telephone No. Guildford 5214-7. Telex No. 8529

MAKERS OF FINE MATERIALS

WHAT'S IN A GOOD REFRIGERATOR?



BICC **Winding Wires.** Behind the ice-cream and the jelly—beyond the reach of acquisitive little fingers—coils of Bicalex winding wire keep the refrigerator working efficiently. In addition to the advantages of mechanical strength, flexibility and compactness, Bicalex enamelled Wires are highly resistant to the Freon refrigerants, and in particular to Freon 22. Bicalex Winding Wires are readily available from 48 BICC Branches throughout the country. There's a BICC Winding Wire for every electrical purpose. If you use winding wires get in touch with us.

British Insulated Callender's Cables Limited 21 Bloomsbury Street, London W.C.1

Danger surrounds creatures of the fields and forests. Nature has equipped them to sense it, to be alert to every slightest warning and to take evasive action—on the instant.

In all the years since man first harnessed electricity he has relied on *porcelain* for protection against its hazards. Most widely used insulation material in the industry, porcelain is both versatile and economical.

WADE porcelain has an unsurpassed reputation for accuracy and dependability.

WADE technicians are at your service to go anywhere at any time. Your enquiries are welcomed and will receive immediate attention.

Think fast Mister Hare!

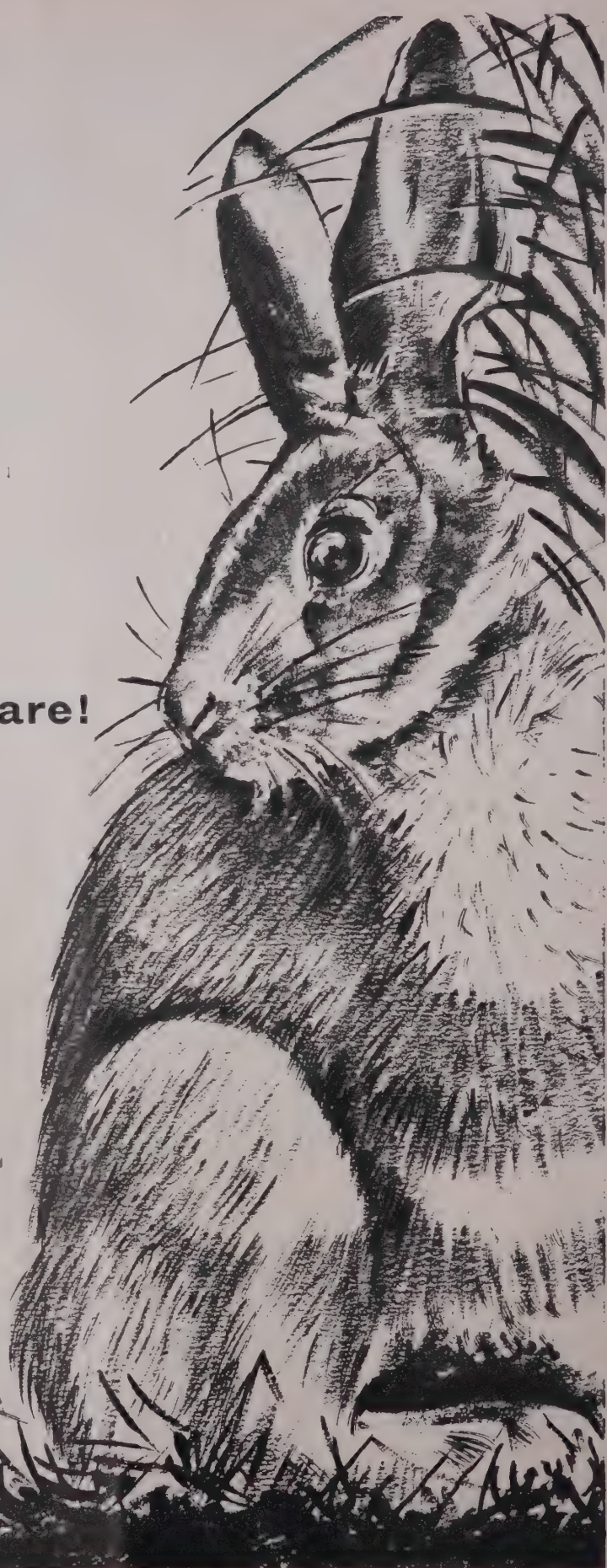


WADE

ELECTRO - CERAMICS

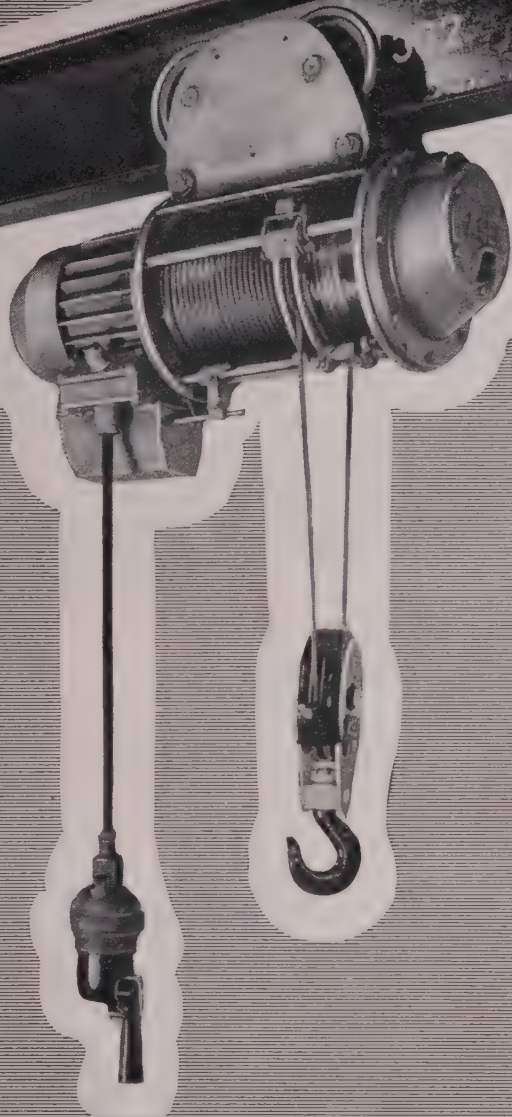
Geo. Wade & Son Ltd., Burslem, Stoke-on-Trent
Wade (Ulster) Ltd., Portadown, Northern Ireland

Members of the Wade Group of Potteries

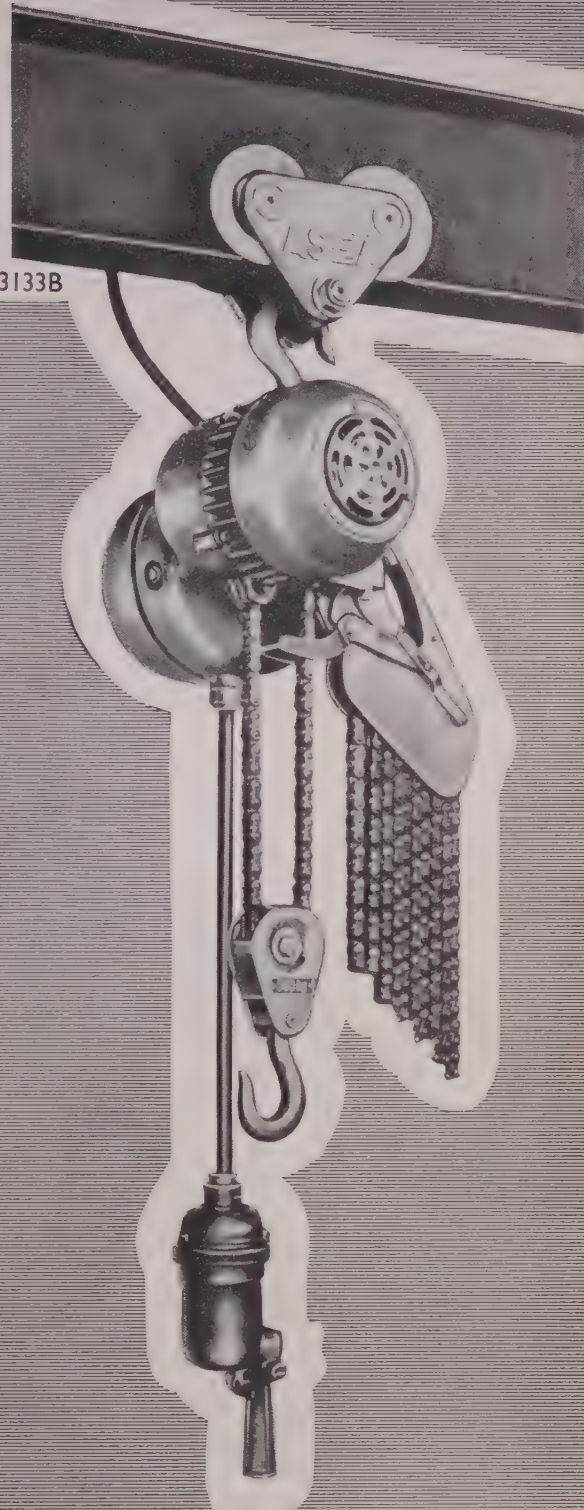


PORCELAIN FOR INSULATION....WADE FOR PORCELAIN

53288



53133B



53133B 5 cwt. and 10 cwt. capacity Roller Chain Hoists. (Type TEA) with single and two speed lifting. Hook and trolley suspension.

53288 1 ton Wire Rope Hoists (Type TMA) with single and two speed lifting.

consult-



A member of the Hawker Siddley Group

Sole U.K. representative for
ASEA Svetsmaskiner AB Stockholm.

FULLER ELECTRIC LIMITED
FULBOURNE ROAD · LONDON E17
Telephone: LARKWOOD 2350.

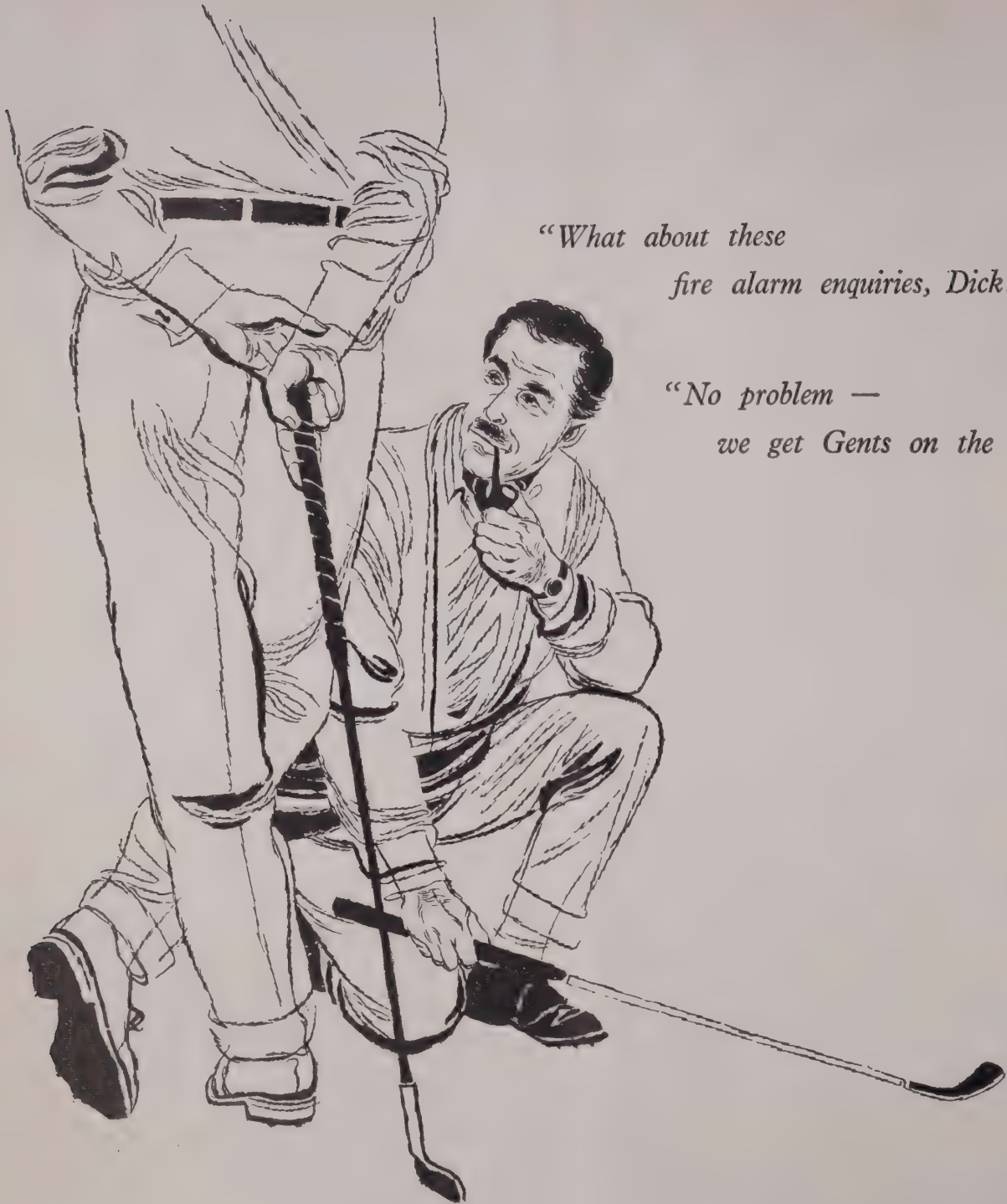
Also at Birmingham, Glasgow and Manchester

NEW RANGE OF POWER-PACKED HOISTS BY ASEA

Built for continuous heavy service, this new range of electric hoists is based on ASEA's 50 years' experience in hoist design. Patented brake release mechanism by parallel rotor and incorporating high safety factor with light weight design.

DELIVERIES: Approximately 8 weeks for new range. Larger capacities, i.e. 2-5 tons in current range, ex-stock.

ASEA



*"What about these
fire alarm enquiries, Dick?"*

*"No problem —
we get Gents on the job."*

GENTS
OF LEICESTER

fire alarms — don't give fire a chance!

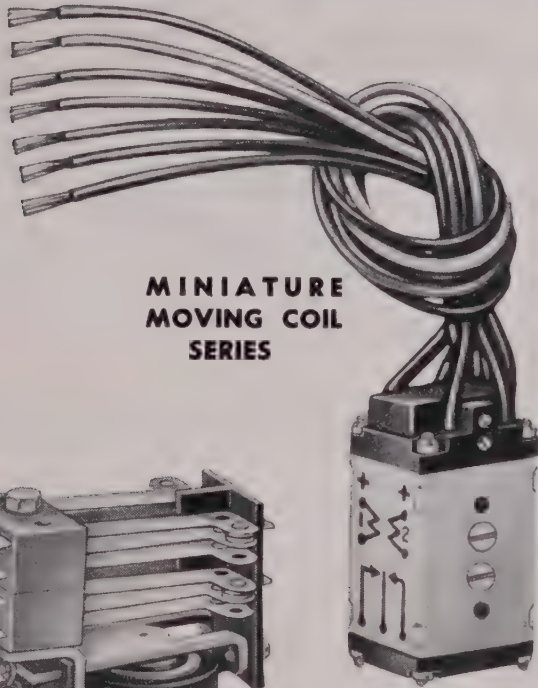
Experience counts . . . Gents have had over sixty years in the fire alarm business and make equipment ranging from simple manually-operated systems complying with the Factory Act to comprehensive detector systems, approved by the Fire Offices' Committee, that give the alarm automatically — *day or night.*

GENT & COMPANY LIMITED • FARADAY WORKS • LEICESTER • London Office and Showroom: 47 Victoria Street, London S.W.1.

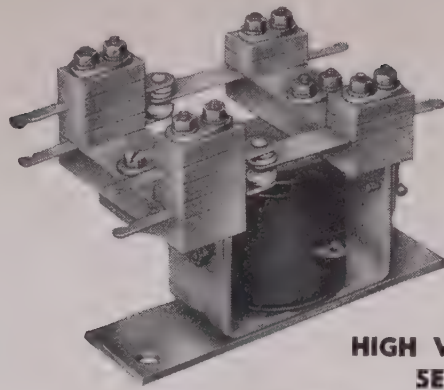
ALSO AT: BIRMINGHAM • BRISTOL • EDINBURGH • GLASGOW • NEWCASTLE • BELFAST

ELECTRO METHODS

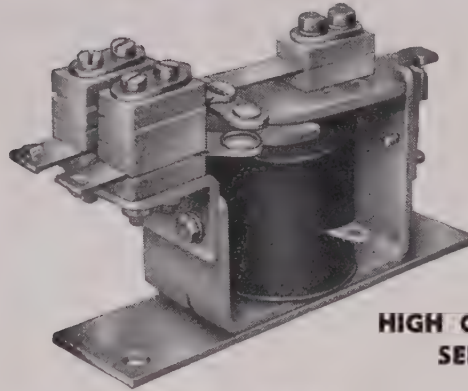
LTD



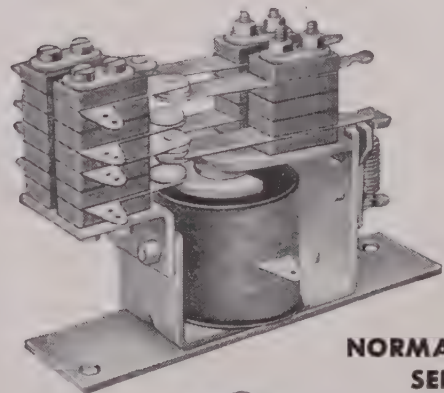
**MINIATURE
MOVING COIL
SERIES**



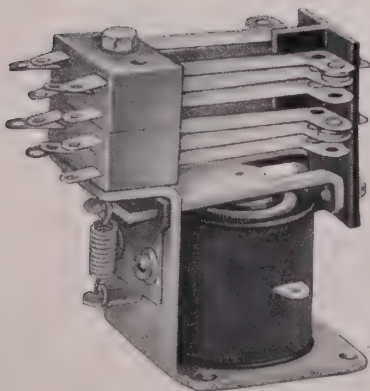
**HIGH VOLTAGE
SERIES**



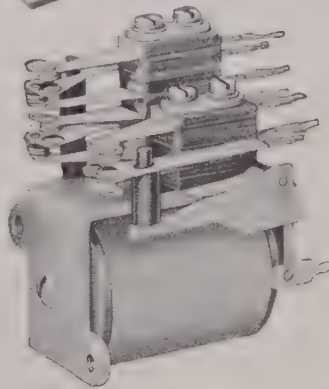
**HIGH CURRENT
SERIES**



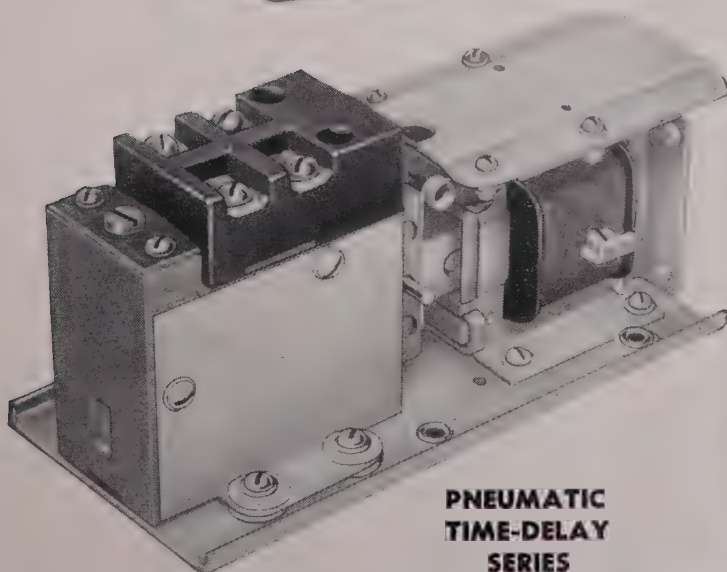
**NORMAL DUTY
SERIES**



**GATE OPERATED
SERIES**



**MINIATURE
SERIES**



**PNEUMATIC
TIME-DELAY
SERIES**

PRECISION RELAYS

Illustrated technical data sent on request :

ELECTRO METHODS LTD., General Products Division, CAXTON WAY, STEVENAGE, HERTS

Telephone: Stevenage 2110-7

FROM ALUMINIUM



MORE ADVANTAGES

There are many applications in electrical engineering where a combination of light weight, ductility and good electrical properties offers obvious advantages. Already, aluminium is being widely used for conductors and structural components. Applications range from busbars to radio and television chassis, from cable sheathing to fan blades, from transmission lines to thermionic valve screens. And remember that many direct uses of aluminium bring important secondary economies.

impalco



Imperial Aluminium Company Limited • Birmingham

aluminium

RIST'S SIMPLIFY WIRING



BY SUPPLYING PRE-FORMED HARNESSES AS COMPLETE WIRING UNITS

- Moulded electrical assemblies
- Approved electrical cables for aircraft
- Cables for airborne and ground electronic equipment
- Industrial cables and flexibles

Please write for our leaflet

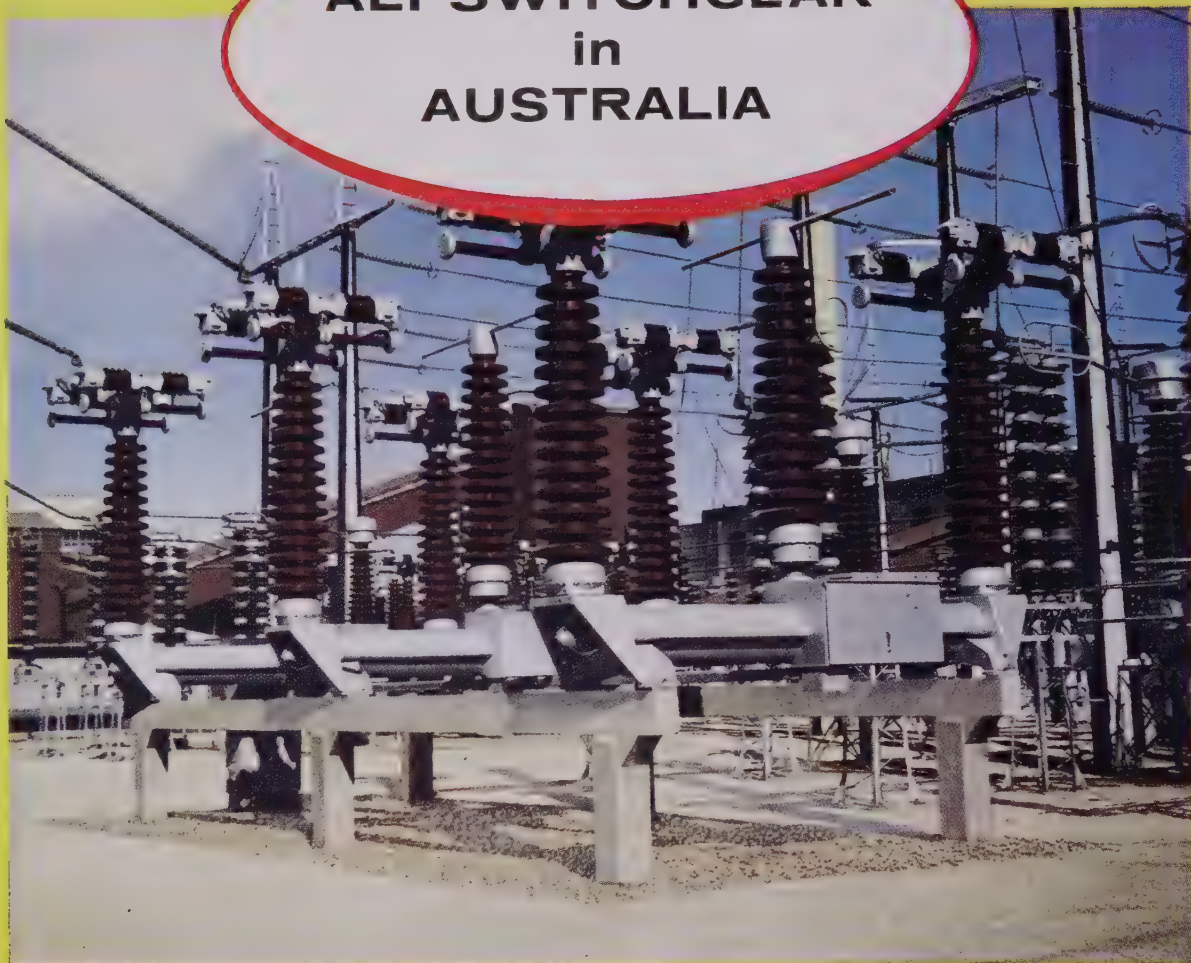
RIST'S WIRES & CABLES LTD
LOWER MILEHOUSE LANE · NEWCASTLE · STAFFS

Sole London Distributors for Housewiring Cables and Flexibles:—

LYMELITE ELECTRICAL INDUSTRIES LTD., 134 Pentonville Road, London, N.1.

Tel: TERminus 9631/2

AEI SWITCHGEAR in AUSTRALIA



*Type GA 10 X 8 air-blast switchgear, at the
Sir Thomas Playford Power Station, Port Augusta, S. Australia.
Photograph by courtesy of the Electricity Trust, S. Australia.*

The first switchgear with a rating of 330kV, 10,000MVA commissioned in Australia was constructed by AEI for the Snowy Mountains Hydro-Electric Authority and the Electricity Commission, New South Wales.

In addition, 275kV switchgear of the type illustrated, is now in service at the Magill Substation, Adelaide and the Sir Thomas Playford Power Station, Port Augusta, South Australia. These installations make a further and impressive contribution by AEI to the development of Australian power resources.

*For further details, write to AEI Switchgear Division,
Trafford Park, Manchester 17, or to your local AEI Office.*



**Associated Electrical Industries Ltd.
Switchgear Division**

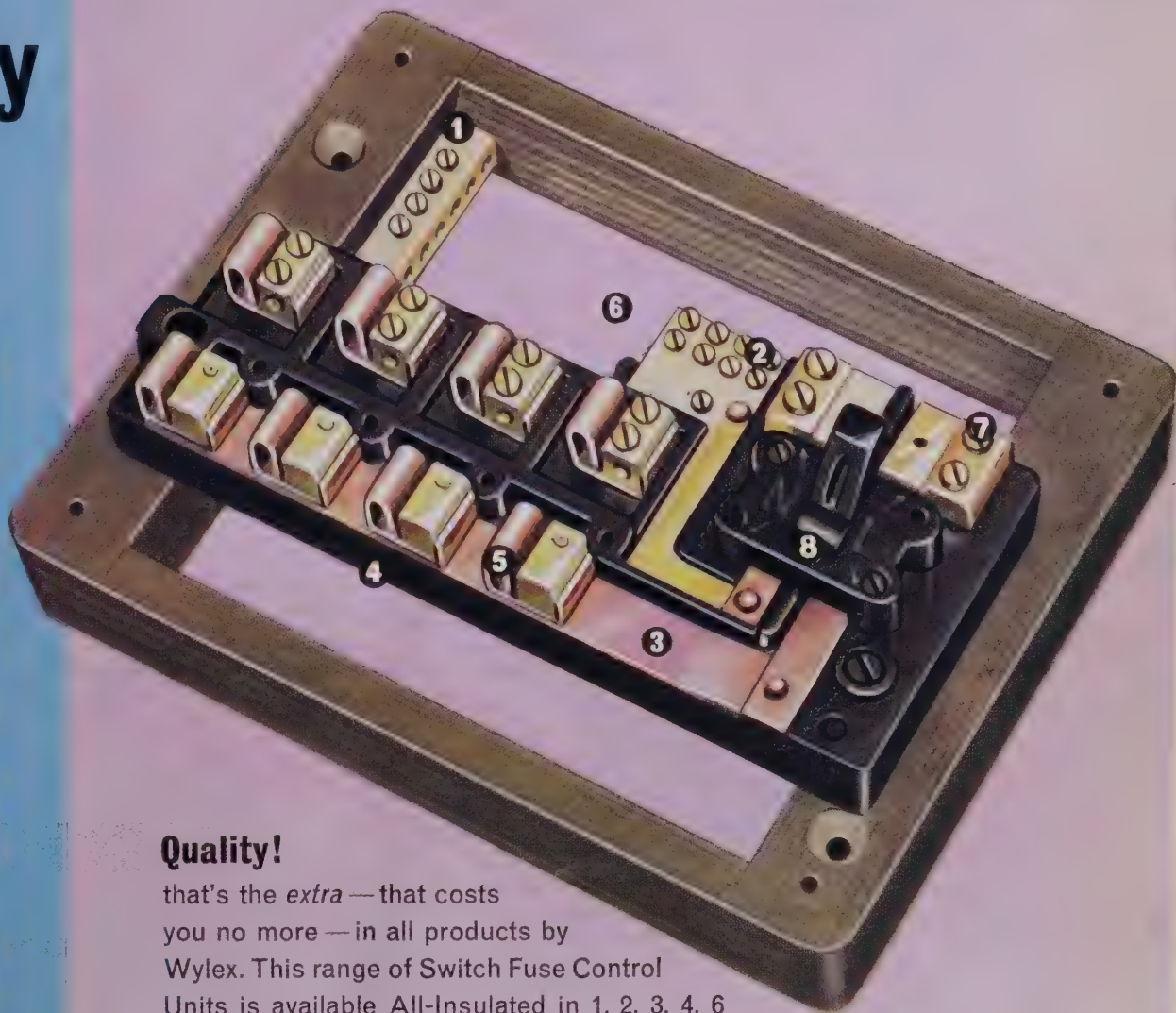
TRAFFORD PARK, MANCHESTER · HIGHER OPENSRAW, MANCHESTER · WILLESSEN, LONDON

F/A 024

Wylex build quality

into Switch Fuse Control Units

- 1 Earth Bar always provided.
- 2 All Terminals easily accessible.
- 3 High grade electrolytic copper Bus-Bar.
- 4 Current-carrying components mounted on non-track Mouldings.
- 5 Fuse Contact Clips of Special design to ensure positive contact.
- 6 Ample wiring room.
- 7 Screws have domed ends — cannot cut into cables.
- 8 Incorporates WYLEX Switch — proven by years of extensive service.



Quality!

that's the *extra* — that costs you no more — in all products by Wylex. This range of Switch Fuse Control Units is available All-Insulated in 1, 2, 3, 4, 6 and 8 way and Metalclad 3, 4, 6 and 8 way, 250v. S.P.&N. Especially easy to stock and make up, to any combination of fuses — rewirable or cartridge. Features the *proven* WYLEX switch with silver-to-silver contacts and sturdy mechanical components.

Wylex Distribution Boards

contemporary to the range of Switch Fuse Control Units available in 4, 6 and 8 way. All-Insulated and Metalclad.



Wylex build quality into . . .

SWITCHES · SWITCHED SPUR BOXES · PLUGS & SOCKETS
COOKER UNITS · SWITCH FUSE CONTROL UNITS

GEORGE H. SCHOLES & CO. LTD. Wylex Works, Wythenshawe, Manchester 22

TRIST SILICONE PRODUCTS



For electrical insulation—
SEATRIST Silicone Sleeving



RONALD TRIST
& CO. LTD.

(a company of the Bell's Asbestos and Engineering Group)

Bath Road, Slough, Bucks

Telephone: 25041 Telegrams: Resvalar, Slough

By reason of its excellent insulating properties and outstanding resistance to high temperatures, small diameter silicone rubber sleeving is used in large quantities in a wide range of electrical equipment including mercury switches, fluorescent lighting installations and transistor radios. This sleeving, which conforms to B.S.2848, type 5, Class 180T, can be supplied in a wide range of colours and sizes. It is superior to ceramic beads since it takes up less space, and it does not harden and deteriorate, like natural rubber and P.V.C. sleeving, when exposed to high temperatures.

Write for Technical Brochure ER-R29/6101.

new atlas super-8 circuit

cuts today's fluorescent lighting costs by 25%

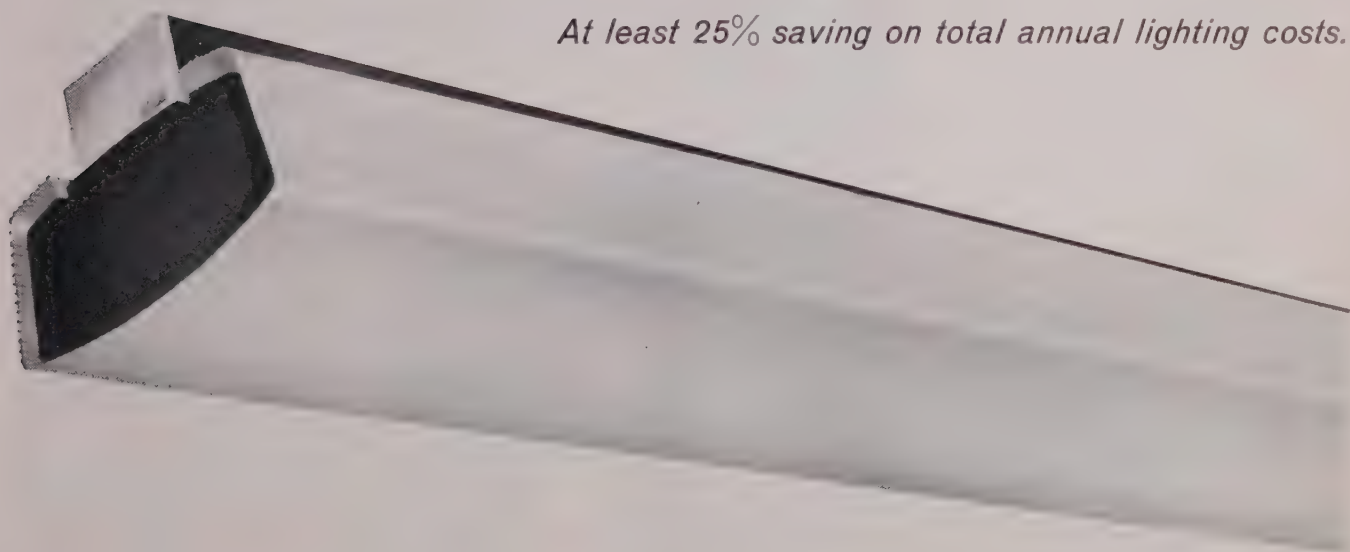
This latest Atlas advance is based on their development of a new 8ft. 85w. tube (with an output of 81 lumens per watt) and new low loss control gear. They form a twin tube unit which offers substantial economies compared with a standard 5ft. 80w. twin fitting.

15% saving on capital cost of lighting fittings

15% saving on capital cost of installation wiring

35% saving on current consumption costs.

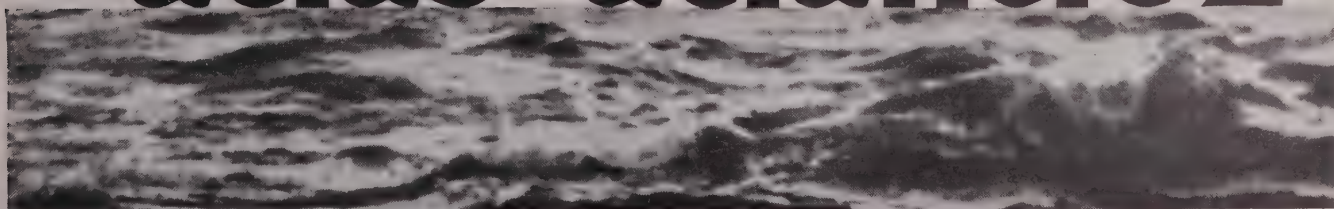
At least 25% saving on total annual lighting costs.



To these advantages more are added when the circuit is incorporated in the 8ft. Atlantic 2 chassis . . . rapid installation, simple maintenance, good design and finish, a complete range of diffuser and reflector attachments.

the super-8 circuit comes to life with

atlas atlantic 2



For complete details please write to: ATLAS LIGHTING LIMITED, THORN HOUSE, UPPER ST. MARTIN'S LANE, LONDON WC2

DIV

Old J.B.'s sitting on top of the world
Well, not exactly. Looks happy
though. I wonder? Let's see
Power Centre man called on Monday,
P.C. discussion on Wednesday,
out to lunch with P.C. man on
Friday. Power Centre? Got it!
J.B.'s installing Power Centre
Trunking. No wonder he looks
happy. Just think, P.C. trunking
throughout. All the top people
use it. It's zinc coated for exceptional
durability and cuts installation costs
by as much as 33½%. What an
investment. Wise man J.B.
Always goes the right way about
tackling a job.

If you've got a trunking job in mind,
take the first step in the right direction
by contacting Power Centre, or, send
for their fully descriptive literature

Address to

THE POWER CENTRE CO., LTD.
P.O. BOX 18, LLOYD STREET,
WEDNESBURY, STAFFS.

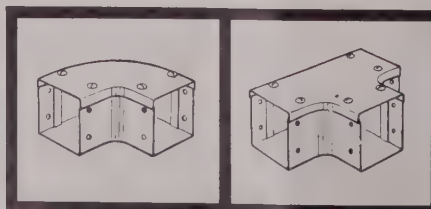
Telephone: Wednesbury 1311.

*Stocks in all Simplex Branches
throughout the country.*

 **ELECTRICAL DIVISION**

life's easy
with
Power Centre
Trunking

POWER CENTRE



Power Centre trunking
fittings. Precision made.
Speeds the job of instal-
lation. Layout extension
or alteration made easy.
Shown left, Elbow
Assembly and Tee
Assembly.



Wootton meter boards are Trumps!

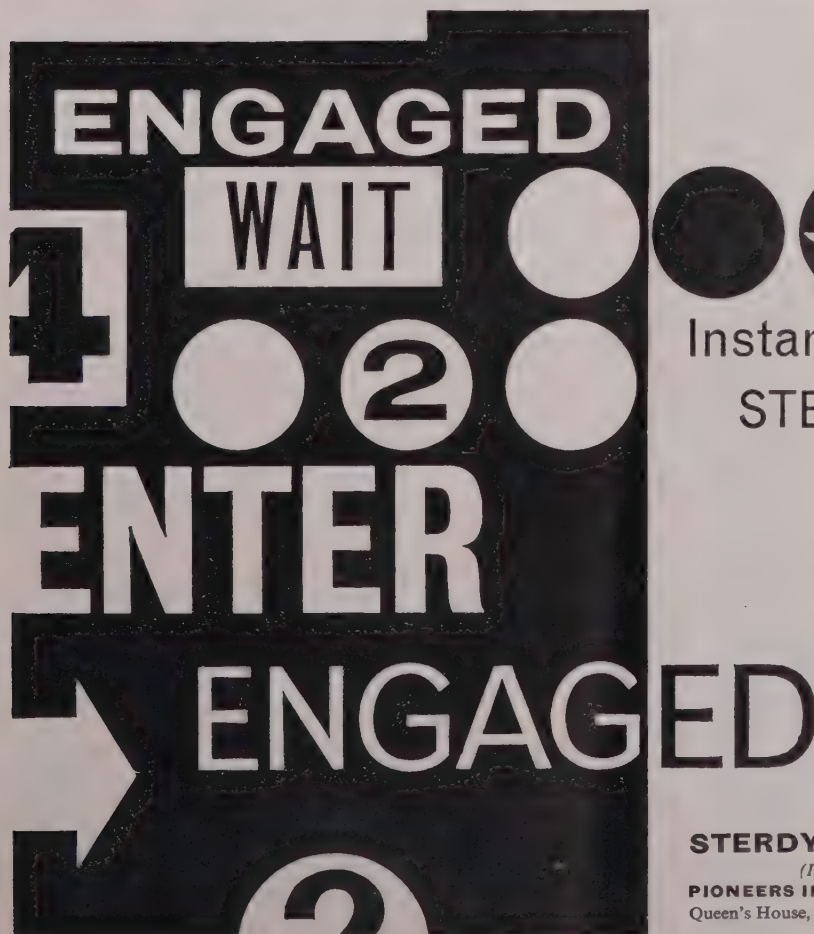
Naturally . . . when they're Wootton-made . . . and Wootton-tested! They're made of the best plywood Wootton could lay hands on. Tested for reliability . . . toughness . . . durability. Wootton meter boards stand up to anything. Even in the most extreme climates. No contraction or expansion or warping with Wootton! Oh, and there's more to Wootton than just meter boards. They make wood blocks too, and instrument cases, and they're aces at sunk switch boxes.

WOOTTON—the meter board people

WOOTTON & CO. LTD

ALMA WORKS · PONDERS END · MIDDX

Telephone: HOWard 1858



Instant visual contact

STERDY luminous signals

Control and communications are playing an increasingly important part in business life, the ability to contact staff quickly and unobtrusively is a golden virtue in these busy times.

Sterdy Luminous Signals in a variety of different forms have been developed to oil the wheels of commerce. They can be used for staff location, as Engaged—Enter—Wait indicators on executive's doors and as lift signals. Ideal for use in Hospitals, Factories and Offices of all sizes, Sterdy Luminous Signals can banish business worries and frustrations—by improved visual communications.

For full details of Sterdy Luminous Signals, write to:

STERDY TELEPHONES LTD

(Incorporating W. C. Davey & Co.)

PIONEERS IN SPECIALISED COMMUNICATIONS

Queen's House, 180-182, Tottenham Court Road, London, W.1

Telephone: MUSEum 4414, 4415 and 6388



ADD EFFICIENCY TO ELECTRICITY

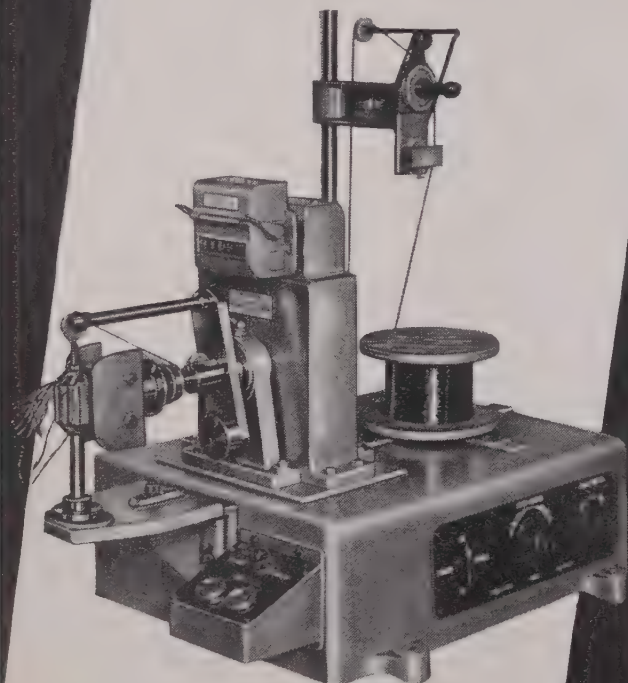
with this specially designed, sturdy, dependable

Quickway

MACHINE

PRODUCTION ARMATURE WINDING MACHINE

(MODEL 2C MK II)



Designed for continuous high speed production of small two-pole armatures of up to 3" core diameter and 2½" core length. Incorporates electro-dynamic brake controlled by automatic pre-determined counter—easily varied for whole range of wire sizes. (45 SWG to 24 SWG.) Winding speed of up to 2000 turns per minute.



Send for further details of this handy, dependable machine to:

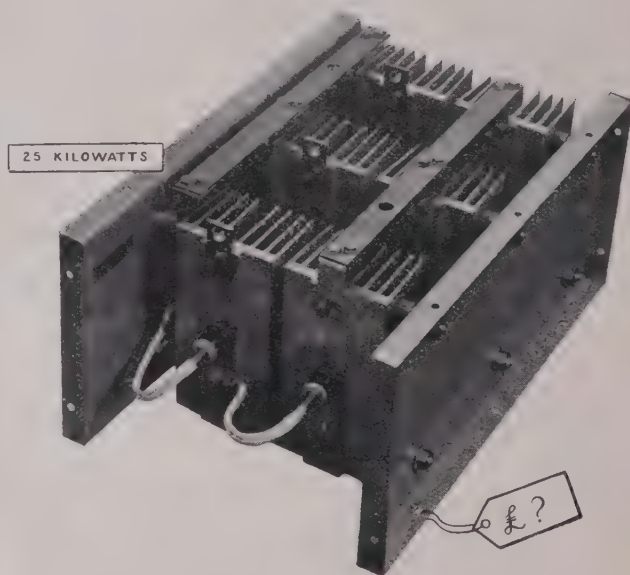
MIDLAND DYNAMO CO. LTD.
QUICKWAY WORKS, LEICESTER

Phone : LEICESTER 50151 (8 lines)

Grams : "DYNAMO" LEICESTER

Md/J1

*Do you
get your
kilowatt's - worth?*



RECTIFIER COSTS **£?** CAN BE
SURPRISINGLY LOW!



The power rectifier stack shown has an output of 135 amperes at 188 volts D.C. and costs only £52. 8. 10d. It is just one of a large range of stacks from 20 to 300 amperes; higher currents may be obtained from multiple arrangements.

Individual cells of 10 ampere and 50 ampere rating with p.i.v. up to 400 v. maximum are available ex stock.

May we tell you more? An enquiry will bring full details.

J. STONE & CO. (DEPTFORD) LTD.

ARKLOW ROAD, LONDON, S.E.14.

TID. 1202

Established 1831

Full information on request from

SEMICONDUCTOR DIVISION

GATWICK ROAD, CRAWLEY.

TEL. 25251



ONLY**DURIUM MASONRY DRILLS****GIVE THIS AMAZING PERFORMANCE**

Durium masonry drills—first in the field—are still far, far ahead in quality, in performance, in *value*. It's important that you should know this, for the name Durium tends to be used loosely nowadays for any masonry drill of similar appearance. Be careful not to fall into this error, for there is positively *nothing* to equal a genuine Durium Drill. Look at these special Durium features:

ULTRA-FAST PENETRATION. Until you've tried Durium, you can have no idea of how quickly brick, tile, cement, slate, marble, etc., can be drilled. Only a Durium drill, with its tough, almost diamond-hard Durium tip, has such amazing speed of penetration and such sharp, silent, easy-cutting accuracy—specially valuable for tricky cavity walls.

PATENTED NO-CLOGGING FLUTE. The patented rapid-helix flute forces out spoil. This prevents clogging, and packing, even in such adverse conditions as damp brickwork.

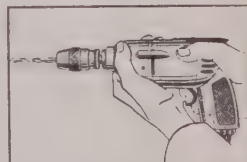
LONGEST LIFE. The extreme toughness of the Durium tip, and the stronger backing given it by the specially designed flute, gives Durium Drills their astonishing ability to withstand the abrasive action of masonry which so quickly ruins ordinary drills. Durium Drills *last* longer. With the Free Sharpening Service in addition, even this long life is doubled!

BIG RANGE—DRILLING LENGTHS UP TO 16".



Durium Drills are made for all sizes of Rawlplugs from No. 6 to No. 30 (i.e. drill cutting diameters $\frac{1}{8}$ " up to 1"), and for Rawlbolts sizes C, D, E & G. Durium Drills are also made in the Long Series to facilitate the work of laying conduits, cables, pipes, etc.—five cutting diameters ($\frac{1}{8}$ " up to $\frac{1}{2}$ ") in 6" drilling lengths, and six cutting diameters ($\frac{1}{8}$ " up to 1") with threaded ends to take extension rods which provide for overall drilling lengths of approximately 12" and 16".

HAND OR POWER. Durium Drills can be used very successfully in an ordinary wheelbrace, but for large-scale use and maximum performance, a Rawlplug R.P.2. Two Speed Electric Drill is recommended. At the lower speed of 420 r.p.m. this easy-to-handle power tool gives quite sensational results with Durium Drills.



FREE RE-SHARPENING SERVICE. When your Durium Drill begins to lose its keen sharpness—and this happens at long last even with Durium!—return it to us with the complimentary voucher supplied with it and we will re-sharpen FREE!



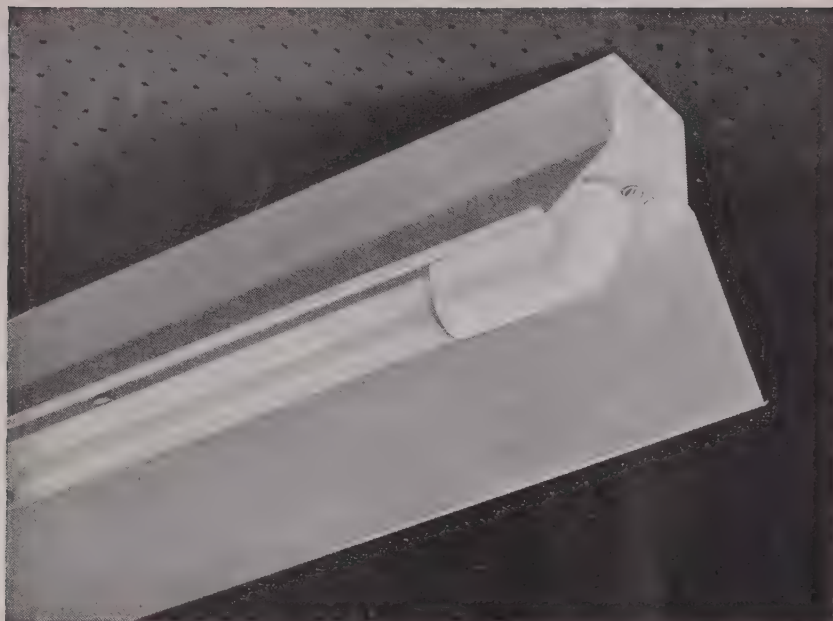
Also in the Durium range are Durium tipped Glass Drills, and Durium tipped Hammer Drills for percussion drilling. Write now for free illustrated literature containing full details of these and other Rawlplug hole-boring tools and Rawlplug Fixing Devices.

Durium Drills are supplied in the bright orange and blue metal containers clearly marked Rawlplug Durium. Look for the name DURIUM on the drill shank—no other is a genuine DURIUM DRILL.

MASONRY DRILLS
—unequalled for performance

B721

**DURIUM**
REGISTERED TRADE MARK



fluorescent lighting fittings

THIS VERY COMPETITIVE FITTING COMBINES SIMPLICITY WITH EFFICIENCY AND HAS ALL THE FEATURES TO MEET MODERN INSTALLATION REQUIREMENTS

key-hole fixing slots · suspension loops provided · full length back plate · three cable entry positions · captive screws retain reflector · resin filled control gear · switch or instant start · lamp end covers quickly detachable · control gear guaranteed 3 yrs. · 3 pin plug & socket extra

OT501 **£4-7-6** switch start less lamp
fitting brochure sent on request

WADES (HALIFAX) limited

TEL: HALIFAX 61637

ARDEN WORKS · FENTON ROAD · HALIFAX · YORKSHIRE

'BOBY'

DEMINEALISATION



Established in 1875

WILLIAM BOBY & CO. LTD

RICKMANSWORTH · HERTFORDSHIRE · ENGLAND · Telephone: Rickmansworth

*Supplied to many of the leading
Industrial Organisations and Corporations in
Gt. Britain and Overseas, including*

Allen & Hanburys Limited
Anjala Paper Mills, Finland
Associated Ethyl Company Limited
British Cellophane Limited
Central Electricity Generating Board
Chemstrand Limited
Courtaulds Limited
Enso-Gutzeit OY, Finland
Fisons Limited
A. H. Hunt (Capacitors) Limited
Lastex Yarn & Lactron Thread Limited
C. A. Parsons & Company Limited
Pfizer Limited
Seager, Evans & Company Limited
The Burma Pharmaceutical Industry
Tyne Chemical Company Limited
Veitsiluoto OY, Finland

Effective 1st September†

PAN AM CUTS CARGO RATES TO THE U.S.A. UP TO 60%

Rate structure simplified, too ...
making Clipper* cargo more profitable and
easier to use than ever before.

Example rate cuts per kilo, London to New York

				PRESENT RATE	NEW RATE
UNDER 45 KILOS				20/1d	15/9d
45/99	„	-	-	15/1d	10/11d
100/249	„	-	-	15/1d	7/11d
250/499	„	-	-	15/1d	6/6d
500/999	„	-	-	13/1d	5/9d
1,000 Kilos and over	-	-	-	13/1d	5/2d

In addition there are many specific commodity rates ranging from 8/8d to as low as 4/4d per Kilo. For fuller details and reservations call your Cargo Agent or Pan American at:

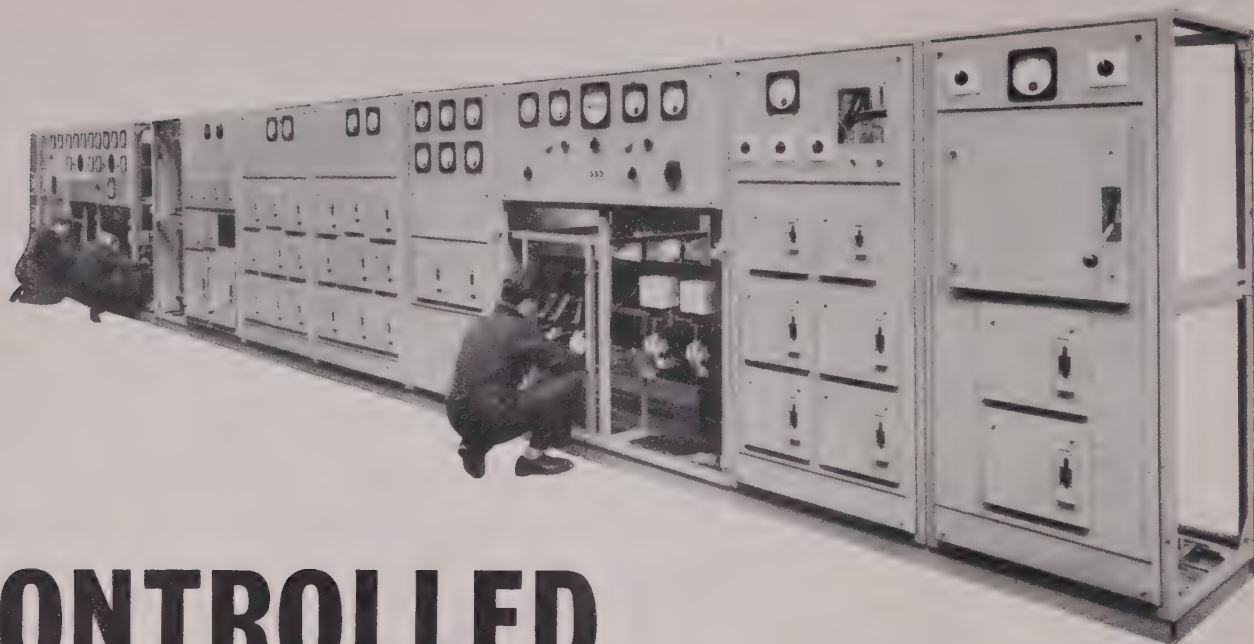
LONDON - - - - - GERrard 9905
BIRMINGHAM - - - - - CENTral 8731
MANCHESTER - - - - - DEAnsgate 3981
BRADFORD - - - - - BRAdford 31717
GLASGOW - - - - - CITy 5744

PAN AMERICAN

FASTEST DELIVERY TO ALL THE WORLD

* Regd. Trade Mark, U.S. Pat. Off.

† Subject to Government approval



*Multi-duty switchboard
for new signal box at
London Road, Manchester.*

CONTROLLED POWER...



25 kVA 'No-Break' generating set undergoing test prior to despatch from the Derby Works.

Fifty years experience has endowed PELAPONE with an unrivalled ability to devise, design and develop automatic equipment * for the generation and control of electrical power . . . equipment which, today, is earning the confidence and approval of engineers everywhere and maintaining the PELAPONE motto:

CONTROLLED POWER . . .
CONTINUOUS POWER.

*Generating plant, including the renowned PELAPONE No-Break sets, cater for all requirements up to 400 kVA. Control equipment for power plant and process systems, ranging from simple engine-mounted panels to multi-duty switchboards and completely integrated control systems.

PELAPONE LIMITED



SALES DIVISION: STEEL HOUSE, EASTCOTE, PINNER, MIDDLESEX.

WORKS: P.O. BOX 4, DERBY.



*Don't get
your wires crossed!*

—get in touch with us, we're really quite efficient.

We have been producing Copper Wire, Strand and Strip for a long time now and are well equipped to meet your needs.



47 VICTORIA STREET, WESTMINSTER,
LONDON, S.W.1
TELEPHONE ABBEY 2771/5

For
really tough
insulation
jobs...



P & B TAPE

P & B Tape is used wherever exceptional resistance to abrasion is essential—in mines, power houses, transformer stations, telegraph and telephone installations. It far exceeds the requirements of the British Standard (No. 1078/1954), gives complete insulation. When you need the *supreme* heavy duty insulating tape, use P & B. In any width from $\frac{1}{4}$ inch.

Manufactured by

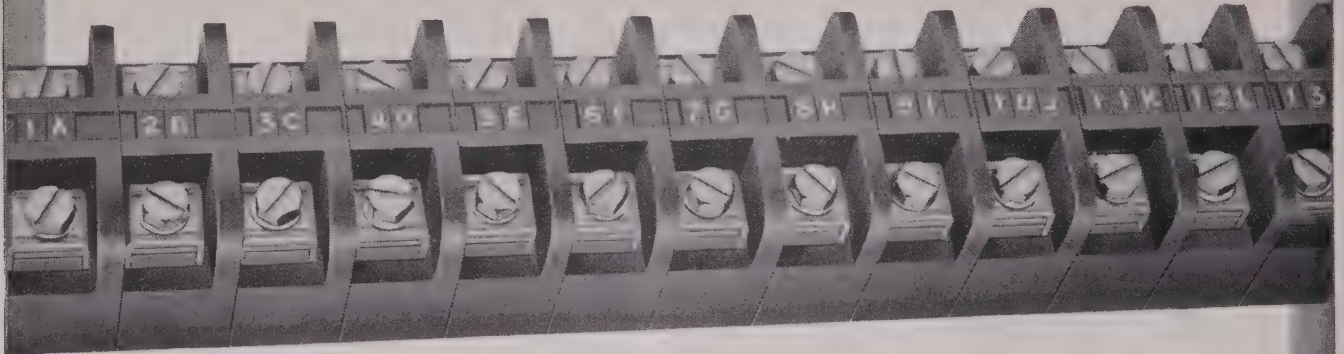
RUBEROID

For full details, write or phone:

THE RUBEROID COMPANY LIMITED,
56A COMMONWEALTH HOUSE • 1-19 NEW OXFORD STREET • LONDON W.C.1
TELEPHONE: HOLBORN 8797 AND 9501

P6807

Join as many of us as you like



MTE MULTI-LOCK TERMINAL BLOCKS

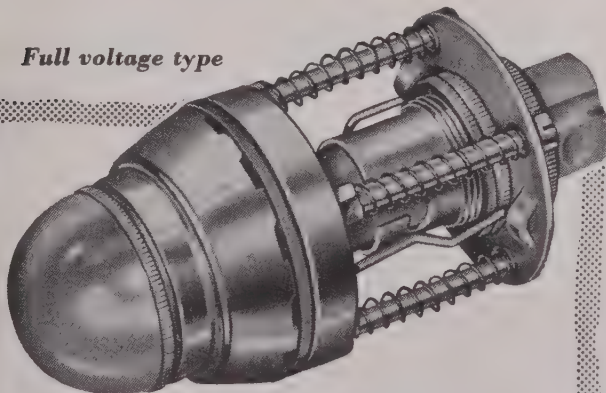


With Multi-Lock you can build up complete terminal block assemblies consisting of any number of single units you choose. They are available in three ratings (15, 40 and 100 amp.) and can be mounted to any surface without special brackets or channels. The 40 amp. and 100 amp. blocks also interlock with one another to give two different ratings in one assembly. All Multi-Locks meet B.S.I. and C.S.A. specifications.

For immediate delivery or further details ring Southend 524281.

M.T.E. CONTROL GEAR LTD · LEIGH-ON-SEA · ESSEX M4

Full voltage type



the new special feature Indicator Lamp

This new oiltight indicator lamp unit incorporates a special feature which results in low running temperatures and minimum size.

Write for details
now!



CRAIG & DERRICOTT LTD.
ROYAL WORKS, SUTTON COLDFIELD
Nr. Birmingham Tel.: Sutton Coldfield 7716/718



As one of the original
manufacturers of Overhead
Steelwork we place our
many years' experience at
your service.

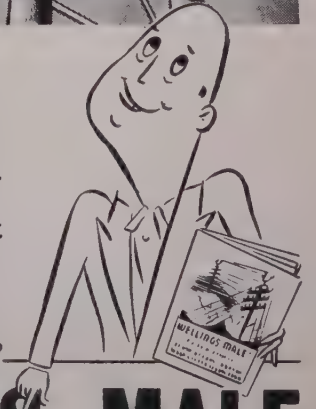
Send for catalogue

WELLINGS, MALE

Tel. W'ton 24691-2-3

& CO. LTD.

FALCON WORKS, CARTWRIGHT ST. WOLVERHAMPTON



FIXED FIRMLY

BOTH SIDES

FROM HERE

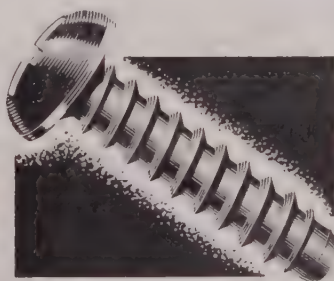
-WITHOUT

GETTING ROUND

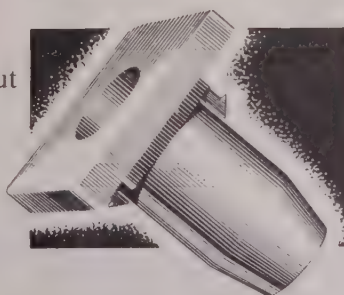
HERE...

GKN *solve one-sided assembly problems
with these New Low-Cost High-Speed Fasteners—*

- * No tapping
- * Assembly from one side
- * Insulated fixing
- * High strength/weight ratio
- * No special tools required
- * Vibration-proof
- * Clips in position and cannot fall out
- * Dust and moisture-proof
- * Low cost



**NPK
Self-Tapping
Screw**



**INSULGRIP
Shock and
vibration-proof
Fastener
in Nylon**

Write today for fully descriptive literature

GEORGE GOODMAN LTD

ROBIN HOOD LANE · BIRMINGHAM 28 · TELEPHONE: SHIRLEY 4491



for
**Electrical
Insulation**

**VULCANISED
FIBRE**

LEATHEROID

EBONITE

BAKELITE
(Fabric & Paper Base)

of every type

The largest and most comprehensive range of insulating materials in the country.

Supplied in sheet, rod and tube form.

ASBESTOS, CELLULOSE ACETATE, CASEIN, CAST RESIN, CHATTERTONS COMPOUND, VARNISHED CLOTH, Tapes & Sleeveings, GLASS CLOTH, Tapes & Sleeveings, MICA & MICANITE, MOULDINGS, NYLON, P.T.F.E. & P.V.C. PLASTICS OF ALL TYPES, PRESSPAHN, SLEEVEINGS, TAPES, VULCANITE

*Also
Turned and
Pressed
Parts*

**HEAVEN, DOWSETT
& Co Ltd.**

INSULATION HOUSE, 315 WELLINGTON ROAD
BIRMINGHAM 20
Phone: BIRchfield 6218-9 Grams: Fibre, B'ham 20

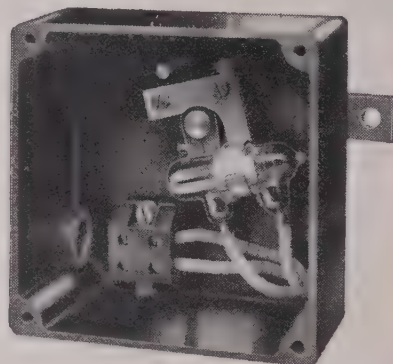
Please write or 'phone if further details or samples are required

MERCURY SWITCHES

★
MERCURY SWITCH
UNITS

★
MERCURY SWITCH
RELAYS

★
CATALOGUE SENT ON REQUEST

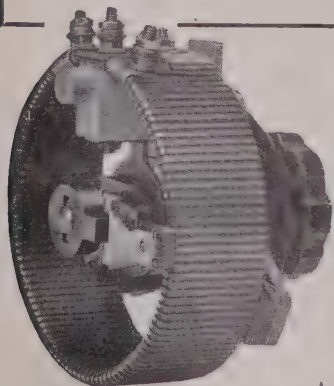


I.A.C. LTD.

Ref. ER, 10 CHASE ROAD
LONDON, N.W.10

a range of extremely robust

ROTARY RHEOSTATS



Open or enclosed types
100 watts
150 watts
200 watts
Larger sizes quoted on request

An extremely robust rheostat with a unique metal cored former (patent appd. for)

Full details from the manufacturers

★
The **CURTIS** Manufacturing Company Limited
26-28 PADDENSWICK ROAD
HAMMERSMITH, W.6
Telephone: RIV. 4456 and 4583

Cable Racks & Hangers



SEND FOR
LIST OF
STANDARDISED
SIZES

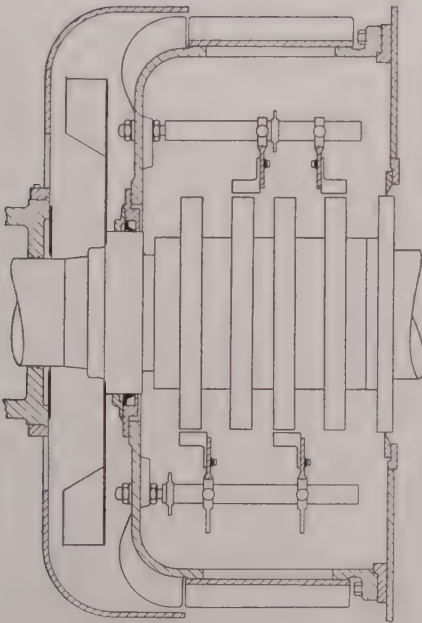


E.D.L. INDUSTRIES LTD., Redbrook Lane, Brereton, Rugeley, Staffs
Telephone: Rugeley 711



What do you—or any engineer—mean by the ‘design’ of a motor? Its electrical design? (Motors of the same type and power can be very much alike in this). Its looks? Or the form it takes: *how* it is put together? We think there is something of all these implied; along with the idea of the way various specific problems of detail have been met and dealt with. Such details distinguish one manufacturer's machine from another because they depend, not on theory, but on experience; on how long the manufacturer has been in the game; on...

This thing called know-how



Take the slip rings on a large T.E. water-cooled A.C. motor. They may be—and often are—within the main enclosure. But on Crompton Parkinson machines they are in a separately cooled chamber sealed off from the rest of the motor. There are two very important advantages in this arrangement. Firstly, carbon dust from brush wear does not get into the motor, where it is impossible to remove and accumulates from year to year. Secondly, access to the slip rings and brush gear is far easier: with the inspection covers removed there are no obstructions; the electrician can work close to the job and see exactly what he is doing. The enclosure is ribbed externally and cooled by its own fan. This is the kind of detail that 80 years of making motors helps one to get right.

Crompton Parkinson

LIMITED



Makers of Electric Motors of all kinds, A.C. and D.C. Generators, B.E.T. Transformers, Switchgear, Cables, Instruments, Lamps, Lighting Equipment, Batteries, Stud Welding Equipment, Traction Equipment, Ceiling Fans.

ACME

MOTOR CONTROL GEAR

For A.C. and D.C. Marine
and industrial applications

• • • • •

- A.C. and D.C. hand operated and automatic contactor starters
- Hand operated or motorised regulators for shunt field control
- Plain rotor regulators for slipping motors and variable speed panels, semi-automatic or fully pre-set
- Standard industrial or marine starters and control panels

Compact in size –
Prompt delivery –
Competitive in Price!

• • • • •

*Your enquiries for special
control gear invited*

Our representatives are always
available to assist you with
your control gear problems

THE **ACME**
ELECTRICAL MANUFACTURING CO.
(TOTTENHAM) LTD.

Tariff Road, Tottenham, London, N.17

Telephone: TOTtenham 2702-3. Grams: Acmelectri, Southtot, London

IMPORTANT NEW BUILDINGS

heated with
**BASTIAN & ALLEN
ELECTRODE BOILERS**

Electricity
Board for
Northern
Ireland



THE CHEAPEST HEAT FROM OFF-PEAK POWER

BASTIAN & ALLEN electrode boilers are being used to heat many important buildings. Using off-peak power with thermal storage, B & A boilers provide central heating at a far lower cost than other systems using electricity, and with greater reliability and efficiency.

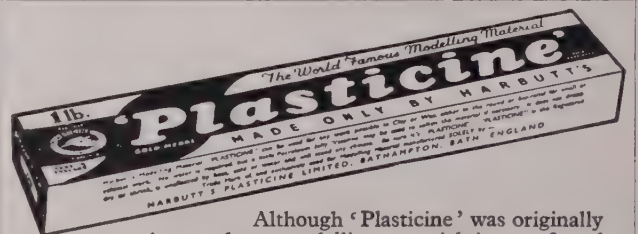
- ★ Fully automatic
- ★ Accurate controls
- ★ NO attendant needed
- ★ NO boiler house
- ★ NO chimney
- ★ NO fuel storage
- ★ NO fumes or fire risk

Write for Catalogue ER



BASTIAN & ALLEN LTD., Ferndale Terrace,
Harrow, Middlesex. Phone: HARrow 7171/6

B.43a



Although 'Plasticine' was originally invented as a modelling material, it soon found wide application in industrial fields—and in the electrical industry in particular. The hundreds of industrial and engineering applications which make 'Plasticine' indispensable in design and development include model making, experiments, alterations and an aid to jigs and tools, etc.

Full particulars from Sole manufacturers

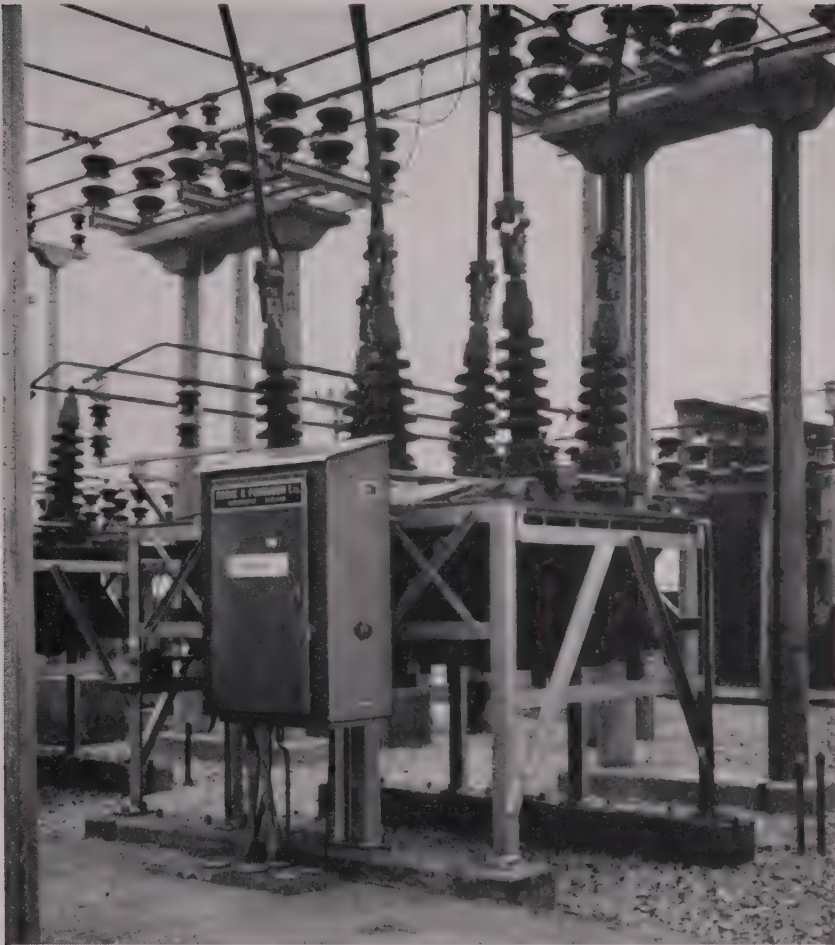
HARBUTT'S PLASTICINE LTD. • Bathampton • Bath • Somerset

TESTOSCOPE MAINS TESTER



For high and low voltage testing, Standard Model: range 100/850 volts A.C. or D.C. Dual Model: range 1/30 and 100/850 volts A.C. or D.C. Send for leaflet 25F. 16-page booklet "Hints on Electrical Testing" now available—1/- post free.

Runbaken
MANCHESTER



For outdoor
or indoor
switchgear

**...UP TO AND
INCLUDING
66 kV**



COOKE & FERGUSON LTD.,

IN ASSOCIATION WITH

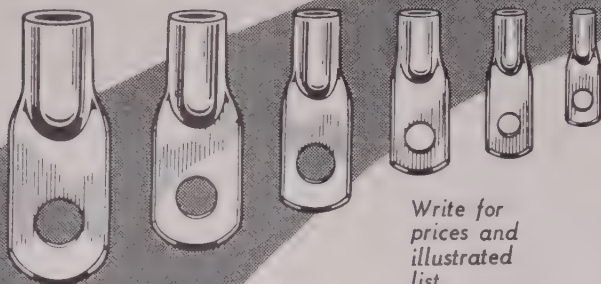
CROMPTON PARKINSON LIMITED

CROMPTON HOUSE · ALDWYCH · LONDON W.C.2



COLD METAL PRESSINGS MANUFACTURERS

1,000 amps.



15 amps.

Write for
prices and
illustrated
list.

COPPER TUBULAR CABLE SOCKETS

DIPPED TINNED

B.S.I. Type No. 91-1930
No. 91-1954

X.L. Light Type

EXCELALL METAL WORKERS LTD.

Phone:
Victoria 0297

BIRMINGHAM 11

Grams:
"Superpress"

**FOR
SOLDERING
THAT'S
CERTAIN...**

**HENLEY
SOLON**
Trade Mark

Best electric soldering irons in the business —
first choice with Industry for over
25 years. Full range available. 25 watt
model illustrated. For leaflet write:

AEI CABLE DIVISION

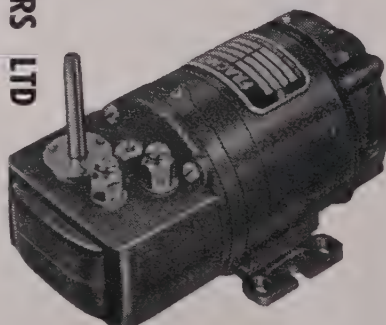
Associated Electrical Industries Limited
Distribution Equipment Sales Department,
145 Charing Cross Road, London, W.C.2
Tel.: GERard 9797

FRACTIONAL H.P. MOTORS LTD

FRACMO MOTORS

Our very wide range includes:

A.C./D.C. Universal, Split Phase, Three
Phase, Capacitor, Synchronous and
Shaded Pole Motors 1/250 h.p. to 1/3 h.p.,
also Geared Units, 0.125 to 600 r.p.m.
with Torque up to 850 lbs./ins.



FRACTIONAL H.P. MOTORS LTD

Rookery Way, Hendon, N.W.9. Phone: COLindale 8022/3/4.

Agents: Law & Plumtree, Dale Buildings, Dale Road, Matlock, Derby-
shire, Matlock 326.

P. A. Bennett, 29 Hollings Drive, Sheffield 6, Sheffield 345967.

DaF7761ER

QUICKEST, SAFEST, EASIEST TO USE FOR EVERY GAUGE WIRING



Registered **SCRUIT** Trade Mark

ONE PIECE PORCELAIN CONNECTORS BRITISH MADE
V.G. PORCELAIN CO. LTD GORST RD., PARK ROYAL, LONDON, N.W.10. Tel: ELGAR 1411/7 (Seven Lines)

Distributors: S.O. Bowker Ltd., Gee (Birmingham) Ltd., Birmingham, and Metway Ltd., Brighton.



AERIALITE MANUFACTURE a complete range of cables and flexibles in rubber and PVC, for Lighting, Heating, Power and Communication Installations. They are manufactured in strict accordance with British Standards Specifications, including B.S.7:1953, B.S.1557:1954 and B.S.2004:1961. Catalogues available on request.



**FOR THE COMPLETE
ELECTRICAL INSTALLATION
SPECIFY**

Aerialite

CABLES AND FLEXIBLES

... for Dependability

Aerialite Ltd Head Office and Cable Division: Castle Works Stalybridge Cheshire Phone STA 2223/8

RESEARCH FOR PERFECTION

*Specialists in the
manufacture of :*

AIR-BLAST SWITCHGEAR
SMALL-OIL-VOLUME SWITCHGEAR
METALCLAD SWITCHGEAR
AIR-BREAK SWITCHGEAR
FLAMEPROOF SWITCHGEAR
SWITCH-AND-FUSE GEAR
CONTROL EQUIPMENT
PROTECTIVE GEAR
A.C. COMMUTATOR MOTORS
ARC-WELDING EQUIPMENT
ELECTRICAL ACCESSORIES



All Reyrolle products are backed by highly organised research and development facilities to ensure the excellence of performance for which they are noted

Reyrolle

A. REYROLLE & CO. LIMITED

HEBBURN - COUNTY DURHAM - ENGLAND



They take it for granted

If there is one item of shopping that is nearest to a woman's heart (and logically to a man's), it is choosing a cooker. This, perhaps, gives rise to a certain conflict of loyalties. On the one hand a cooker must do an efficient job in providing for the inner man; on the other it has to be an attractive and prized piece of kitchen furniture.

Fortunately, with modern electric cookers the situation is easily reconcilable. Nevertheless, there are many pros and cons to be weighed in the balance.

One rather important component, however, is likely to be taken for granted. That is the heating element. The cooker manufacturer may rest easy in his mind about this so long as the element is wound with Nichrome* electrical resistance wire. We have been making and developing this alloy for fifty years, and we are glad to say it has the confidence of leading cooker manufacturers.

*Regd. Trade Mark

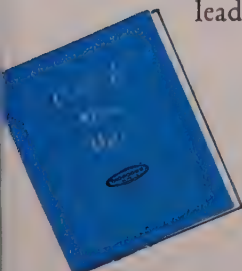
NICHROME* for heating elements up to 950°C.

NICHROME*V for heating

elements up to 1150°C.

BIMETAL for thermostats

DRIVEX* CABLES for leads



"Electrical Alloy Data" contains 84 pages of fundamental information concerning the use of electrical resistance alloys. Copies are available free of charge on request.

BRITISH DRIVER-HARRIS CO LTD

CHEADLE HEATH, STOCKPORT, CHESHIRE



CRATER

ROTARY SPECIALISTS

"C SERIES"

Rotary

15/30 amps. 220/440 V, AC.

Up to 8 positions

OTHER ROTARY TYPES

MF Series 5 amps. 250 V, AC.

Up to 12 positions

R. 10 Series 10 A, 250 V, AC.

Up to 8 positions

250 V, AC./DC. 4 positions

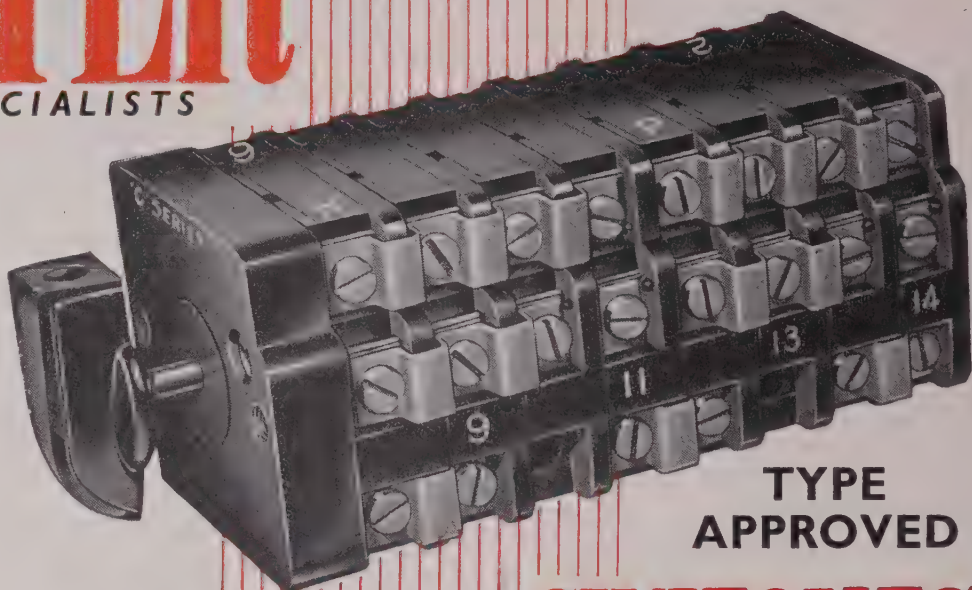
Hermetically Sealed Spindles

Key Operated

Single and Multi-way

Push Button Switches

Appliance Switches



TYPE
APPROVED

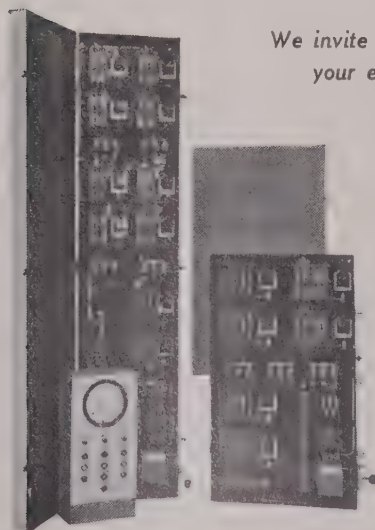
SWITCHES

CRATER PRODUCTS LTD • KNAPHILL • WOKING • SURREY

MOTOR CONTROL PANELS

To customers' requirements

We invite
your enquiries



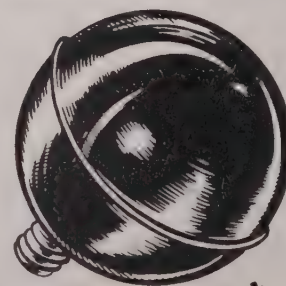
Manufactured by

ASQUITH ELECTRICS (Colne) LTD.

formerly Colne Switchgear (K. & W.) Ltd.

Walton Street, Colne, Lancs.

Telephone: Colne 1394/5



SPHERICAL
KNOBS



A wide range of sizes with
male or female threads
for the Electrical and
Engineering Industries
Full range of colours

Litholite
Plastic Moulders
since 1901

LITHOLITE Insulators & St. Albans MOULDINGS LTD.
Sandown Road, WATFORD, Herts. Tel. WATFORD 23377

FERRANTI

GENERATOR TRANSFORMERS

for the

ELLAND POWER STATION

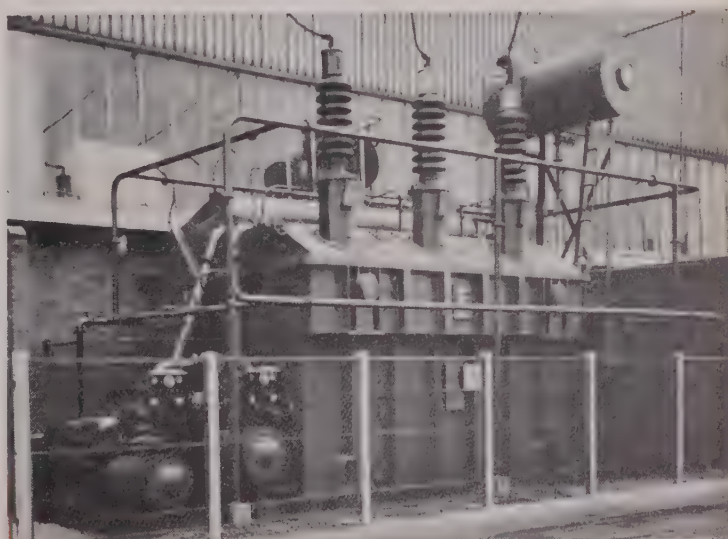
(CENTRAL ELECTRICITY GENERATING BOARD)

3

72,000 kVA, 11·8/141·6 kV

3 phase generator transformers

OFW type.



FERRANTI

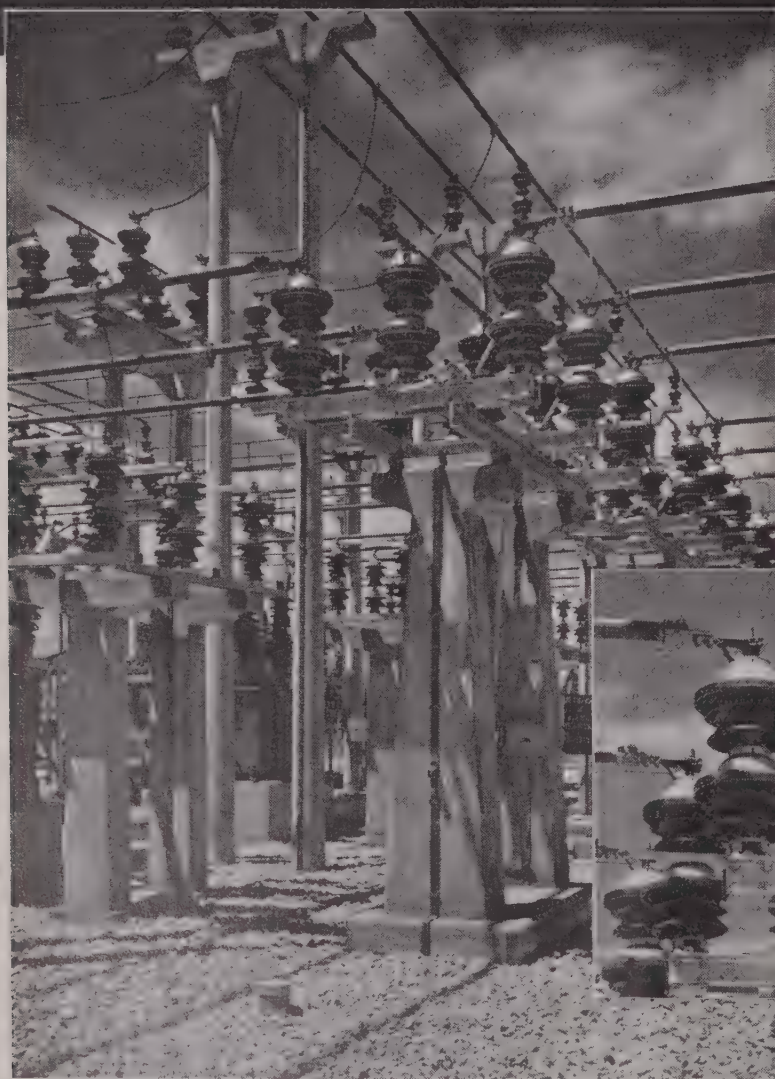
First into the Future

Specify FERRANTI TRANSFORMERS famous throughout the World

FERRANTI LTD · HOLLINWOOD · LANCs · Tel: FAIlsworth 2000
London Office: KERN HOUSE · 36 KINGSWAY · W.C.2 · Tel: TEMple Bar 6666

HACKBRIDGE AND HEWITTIC

H.V. OUTDOOR OVERHEAD LINE ISOLATORS



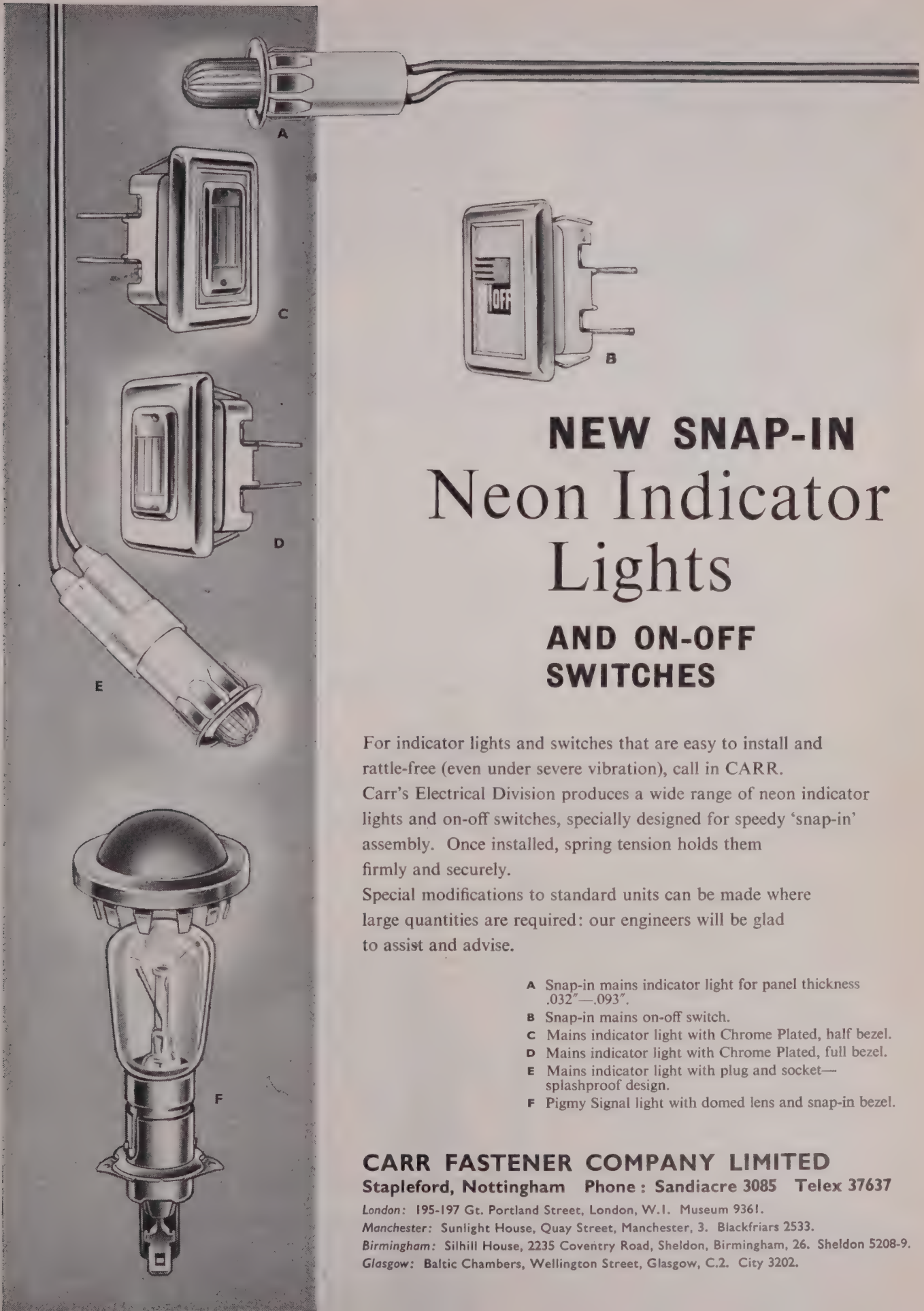
Hackbridge and Hewittic 66 kV double horizontal-break isolators with earthing blades installed at Swartkops Power Station, Port Elizabeth, South Africa.



HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD.

HERSHAM · WALTON-ON-THAMES · SURREY

Telephone: Walton-on-Thames 28833 (8 lines) Telegrams & Cables: Electric Walton-on-Thames



NEW SNAP-IN Neon Indicator Lights AND ON-OFF SWITCHES

For indicator lights and switches that are easy to install and rattle-free (even under severe vibration), call in CARR.

Carr's Electrical Division produces a wide range of neon indicator lights and on-off switches, specially designed for speedy 'snap-in' assembly. Once installed, spring tension holds them firmly and securely.

Special modifications to standard units can be made where large quantities are required: our engineers will be glad to assist and advise.

- A Snap-in mains indicator light for panel thickness .032"—.093".
- B Snap-in mains on-off switch.
- C Mains indicator light with Chrome Plated, half bezel.
- D Mains indicator light with Chrome Plated, full bezel.
- E Mains indicator light with plug and socket—splashproof design.
- F Pigmy Signal light with domed lens and snap-in bezel.

CARR FASTENER COMPANY LIMITED

Stapleford, Nottingham Phone: Sandiacre 3085 Telex 37637

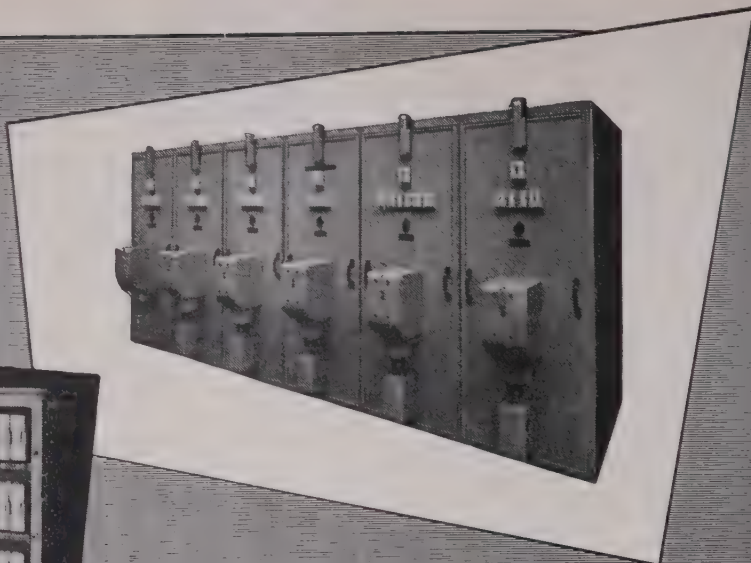
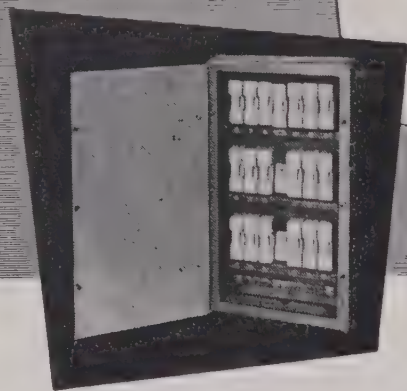
London: 195-197 Gt. Portland Street, London, W.1. Museum 9361.

Manchester: Sunlight House, Quay Street, Manchester, 3. Blackfriars 2533.

Birmingham: Silhill House, 2235 Coventry Road, Sheldon, Birmingham, 26. Sheldon 5208-9.

Glasgow: Baltic Chambers, Wellington Street, Glasgow, C.2. City 3202.

**from
substation
to
sub-circuit**



H.T. & L.T. SWITCHGEAR

Truck and cubicle switchboards up to 11 kV 250 MVA. A.S.T.A. certified oil circuit breakers. Remote control panels. Ring main units. Isolating switches. Unit type industrial switchgear. Ironclad distribution boards and switch fuses.

THE NEW SWITCHGEAR CONSTRUCTION CO. LTD.

WELLESLEY ROAD SUTTON SURREY

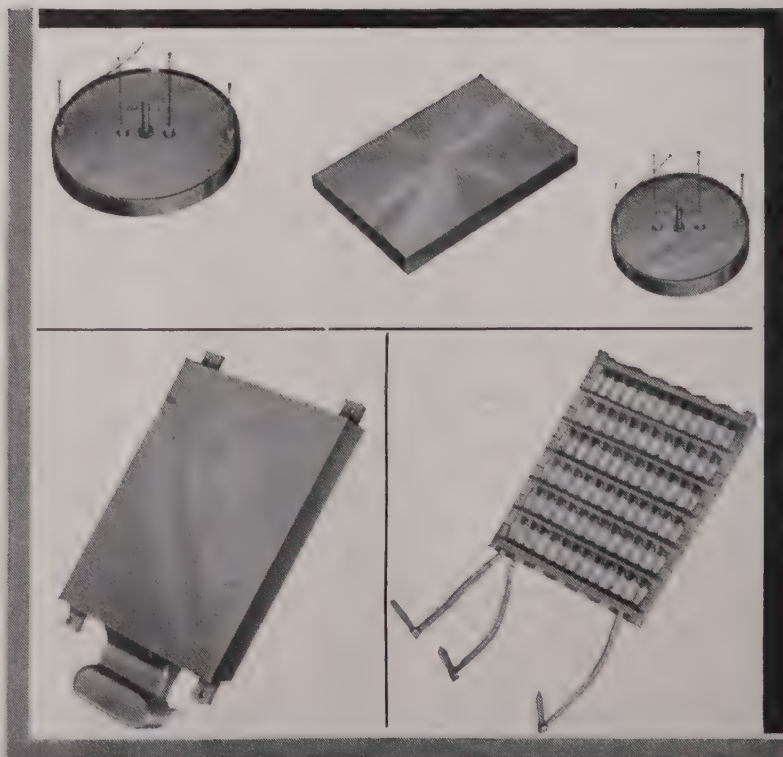
TELEPHONE: VIGILANT 8234

Associated with Hackbridge & Hewitt Electric Co. Ltd.

**GRILLER BOILER
AND HOT PLATES
for modern cookers**

Our solid boiling plates are of special construction designed to eliminate the possibility of cracking in service. The junctions between the leads and the plates are of improved pattern. A special lead is fitted on all plates. The boiler plates are produced from high quality steel. British made ceramic insulators. Best quality 80/20 nickel chromium heating coils. Insulator assemblies available with or without insulated leads and terminal boxes.

Individually packed and boxed.



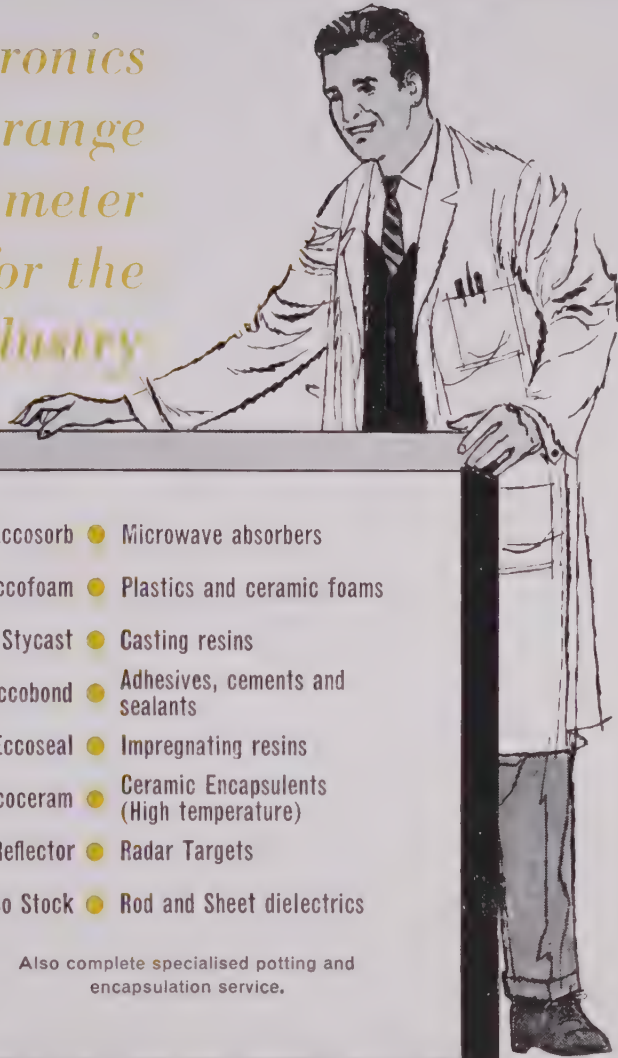
GENRISTO LTD

OSMASTON ST., NOTTINGHAM
Wholesale

Notem. 47285

**THE ELEMENTS OF
GOOD HEATING**

*Microcell Electronics
offers the widest range
of controlled parameter
plastics for the
electronics industry*



- Eccosorb ● Microwave absorbers
- Eccofoam ● Plastics and ceramic foams
- Stycast ● Casting resins
- Eccobond ● Adhesives, cements and sealants
- Eccoseal ● Impregnating resins
- Eccoceram ● Ceramic Encapsulents (High temperature)
- Ecco Reflector ● Radar Targets
- Ecco Stock ● Rod and Sheet dielectrics

Also complete specialised potting and encapsulation service.



These products are used in such diverse products as waffle irons and guided missiles and each has been designed to solve a complex problem in Electronics.

Famous for many years in America, the complete range of Ecco plastics are now available in this country from Microcell Electronics. Full details on Plastics for Electronics are available from Blackwater.



electronics

A DIVISION OF MICROCELL LIMITED

Blackwater, Nr. Camberley, Surrey
Telephone: Camberley 3461

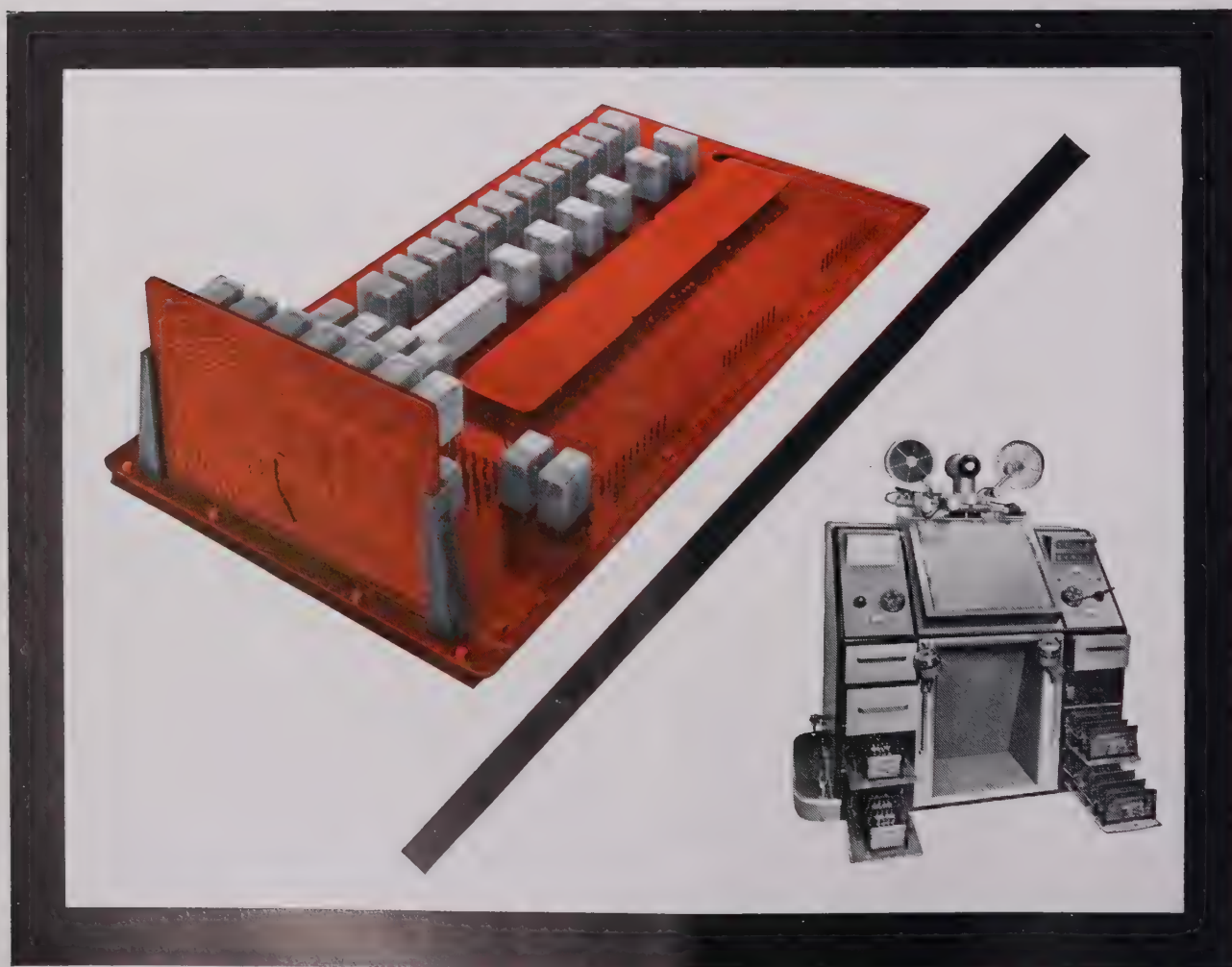
PROGRESS THROUGH KNOWLEDGE

Take a look and you'll find...

Finest quality FORMICA Industrial laminates underlie many modern component designs. A case in point is this new film assessor designed and manufactured by Aeronautical and General Instruments Limited. The efficiency of this assessor is based on the use of printed circuits made from FORMICA double sided copper clad material. FORMICA copper clad laminates are highly dependable for this important job in the field of electronics. They are economical and require no maintenance.

You'll find FORMICA Industrial laminates in all the best of British products from the smallest radio to the largest machine. High quality is backed by an unsurpassed technical service, and Formica Limited make paper, glass, fabric and copper clad laminates, engraving material and inter-laminate prints.

FORMICA* INDUSTRIAL LAMINATES



For full information on FORMICA Industrial laminates write to :

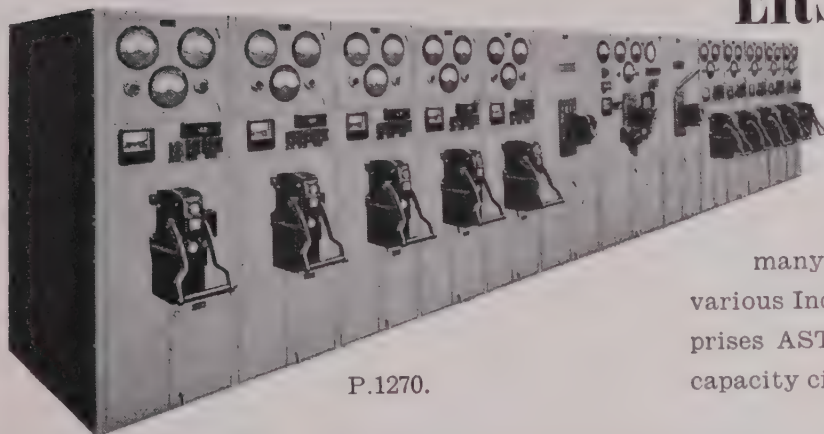
FORMICA LIMITED (Industrial Laminates Division)

84-86 REGENT STREET, LONDON, W.1.

TELEPHONE: REGENT 8020

*FORMICA is a registered trademark

Indian Railways AGAIN choose "ERSKINE HEAP"



P.1270.

Switchboard recently supplied to and installed by the Central Railway of India in their Parel Sub-Station. This is one of

many switchboards supplied to the various Indian Railway systems and comprises ASTA certified 25 MVA rupturing capacity circuit breakers.



Illustration left shows the "Deccan Queen" the world famous express of the Central Indian Railway, passing the Parel Sub-Station at speed.

WE
MANUFACTURE:—
L.T. SWITCHGEAR
50/7,000 Amperes.
E.H.T. SWITCH-
GEAR up to 11 kV.
250 MVA rupturing
capacity. MOTOR
CONTROL GEAR
1/5,000 H.P.

THE SWITCHGEAR
WITH THE WORLD
WIDE REPUTATION

ERSKINE, HEAP & CO LTD

SWITCHGEAR SPECIALISTS

Head Office & Works
SALFORD MANCHESTER (7)

London Office
GRAND BUILDINGS, TRAFALGAR SQ., W.C.2

BRANCH OFFICES AND AGENCIES IN ALL PARTS OF THE WORLD

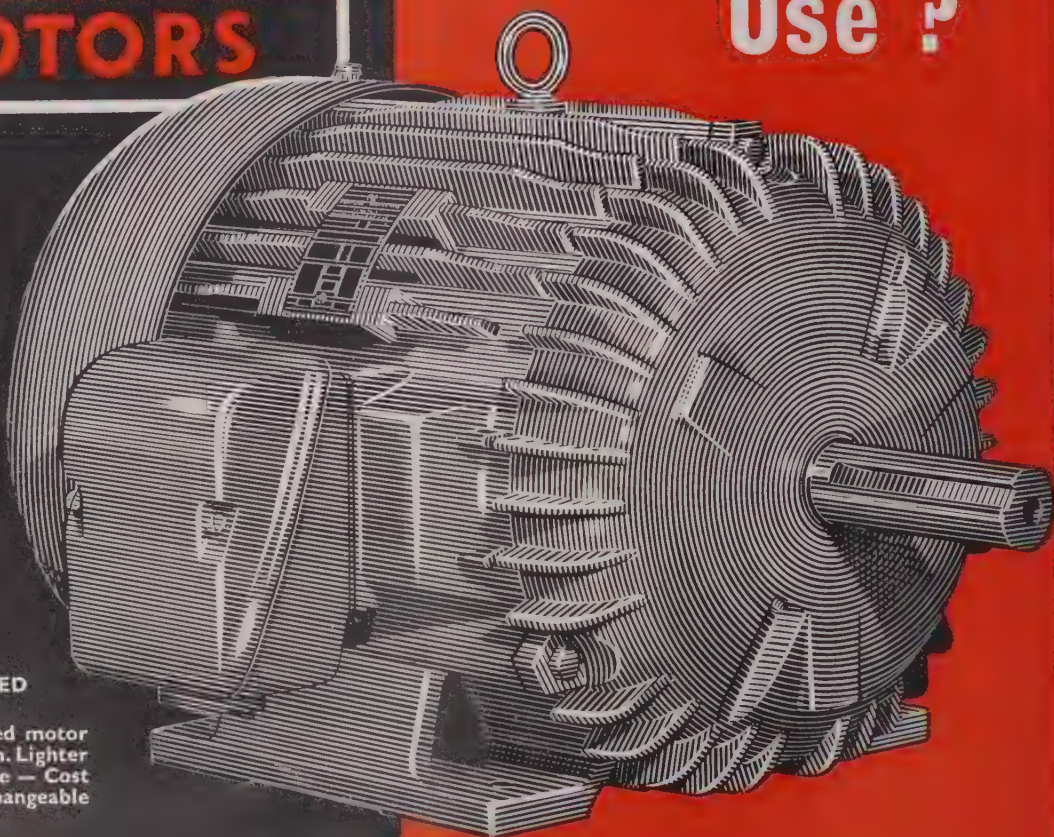


MAY WE HAVE YOUR ENQUIRIES?

BROOK

ELECTRIC MOTORS

Which
Motor
Should
You
Use ?



TOTALLY ENCLOSED
FAN COOLED

'D' Type Standardized motor
with class 'E' insulation. Lighter
weight — Smaller size — Cost
saving — Fully interchangeable
for fixing dimensions.

BROOK MOTORS LTD.

H U D D E R S F I E L D

PUBLICITY DEPT. A3, BROOK MOTORS LTD.
EMPRESS WORKS, HUDDERSFIELD

Please forward a copy of
"WHICH MOTOR SHOULD YOU BUY"

NAME

POSITION

FIRM

ADDRESS

.....

.....

Send coupon
for your copy
of this booklet
NOW

from 1/25th. to 600 horsepower

THE MOMENT OF DECISION

- * Deciding which electric motor to buy is not the easiest of tasks ... but careful selection pays in higher efficiency and lower maintenance cost.
- * There are literally thousands of variations in horse power, speed, enclosure and electrical characteristics. Each combination of features making the right motor for a particular type of work.
- * Brook have listed many of these variations in a new publication, which contains helpful information on all aspects of electric motor application and detailed instructions for ordering.
- * You can have a copy of this profusely illustrated booklet by sending the coupon at the left hand corner of this advertisement. Post it now!

WHY BROOK?

- * Because all basic materials are tested in their research laboratories all components are machined on modern plant ... all parts and sub-assemblies are carefully inspected.
- * Brook motors run cooler, they are designed to run on full load below the Standard temperatures, giving extra overload capacity.
- * Brook products are supplied with all the technical assistance you need, either before you buy or afterwards. Service and spares are available in almost every country in the world.

**A CALL TO ANY OF THE NUMBERS LISTED BELOW
WILL BRING YOU IMMEDIATE SERVICE.**

Huddersfield 8400—London MET. 9401/7—Aberdeen 21890
Birmingham Mid. 0182/5—Bristol 27671/2—Glasgow Cen. 1045
Leeds 34303/4—Leicester 50781/3—Liverpool Roy. 4100 & 6261
Manchester Cen. 8305/7—Newcastle 81-4338/9—Norwich 25099
23444—Nottingham 55412/3—Plymouth 62609—Sheffield 28477/8
Swansea 57559

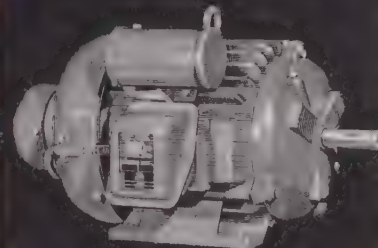
U.S.A. Chicago
INdependence 3-6464

CANADA Toronto
CHerry 9-3309. ROger 3-5151/2



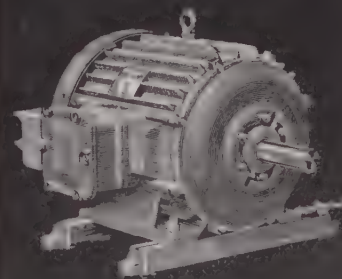
DRIP PROOF

'C' type motor to B.S.2960. For all normal driving applications.



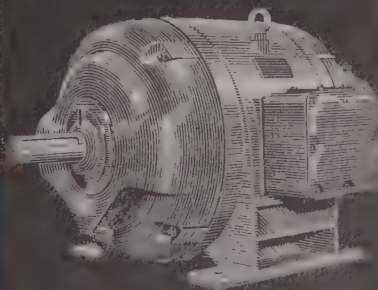
SINGLE PHASE CAPACITOR

Available in T.E. Fan Cooled (as shown) or in Drip Proof enclosure. Both types have a robust, easily accessible centrifugal switch.



FLAMEPROOF

A compact design. British Standard F.L.P. certified for gases in Groups I, 2 and 3. Interchangeable with T.E.F.C.



LARGE SLIP RING

Cage or slip ring types in larger Drip Proof frames are made up to 600 h.p.

T.E. Fan Cooled motors are offered up to 275 h.p.

ANOTHER NEW INSTRUMENT by MARTINDALE

The

PHASE and CONTINUITY INDICATOR

WITH THIS INSTRUMENT AN ELECTRICIAN CAN:

- 1 Prove continuity of all phases.
- 2 Ascertain faulty line if continuity is not proved.
- 3 Identify the phase colour of worn or faded leads.
- 4 Ascertain the sequence of phase rotation.
- 5 Obtain correct phase balancing.
- 6 Make correct connection of a motor where wrong rotation may cause serious damage to machinery.

Compact; only measures $3\frac{1}{2}'' \times 2\frac{1}{2}'' \times \frac{3}{4}''$; almost unbreakable; no moving parts.

Write for illustrated leaflet to:

MARTINDALE ELECTRIC COMPANY LIMITED, 4 Westmorland Road, London, N.W.9

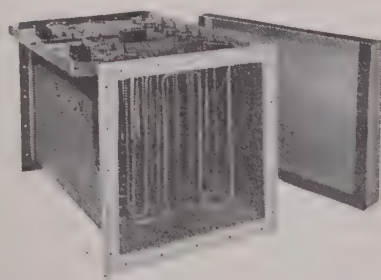
COLindale 8642



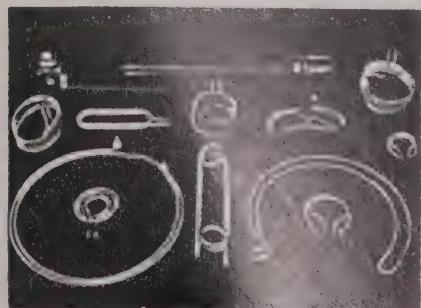
**A UNIQUE
MULTI-PURPOSE TROUBLE
TRACING INSTRUMENT**

ELTRON for ELEMENTS

AIR DUCT HEATING UNIT



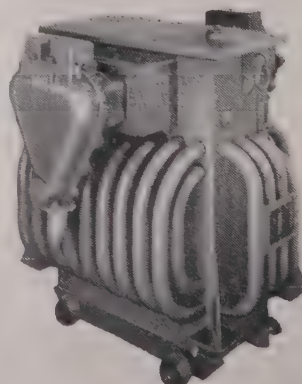
**Special ELEMENTS
for AIR, OIL and WATER**



● Q U I C K
C O M P E T I T I V E
P R I C E S ●

Eltron (London) Ltd., Southmore Road, Croydon
Telephone: Thornton Heath 1861

'Stewart' TRANSFORMERS



Suitable for any
Equipment where
loadings up to
250 KVA (double wound)
are required

VOLTAGES UP TO 66 KV
CURRENT UP TO 2500 amp.

For . . .
ELECTRO-PLATING
RECTIFIER EQUIPMENT
FURNACES—
EVERY INDUSTRIAL
APPLICATION

Illustration shows a 50 KVA 3 Phase distribution
transformer, outdoor type. Voltage ratio
6,600/440 volt.

STEWART TRANSFORMERS LTD.

Kilburn Lane, London, W.10 Tel: LADbroke 2296/7



They judge it
by the SWITCH

...the vital component that enables your appliance to do its job, bringing better living, boosting your reputation for fine products.

NSF/Cutler Hammer switches are quality-built to withstand tough day-to-day usage in all conditions. There is an NSF switch for most appliances and voltages — our illustrated literature describes the full range.

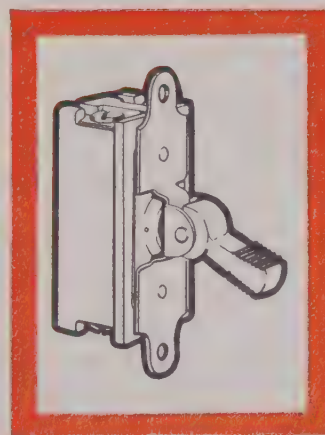


"THE SWITCH PEOPLE"



NSF/Cutler-Hammer Lever Switch

These flush mounting quick make and break switches are used extensively for domestic appliances and for many industrial purposes.



NSF LIMITED · INGROW BRIDGE WORKS · KEIGHLEY · YORKS

SALES OFFICE: 31-32 ALFRED PLACE · LONDON · W.C.1. TELEPHONE: LANGHAM 9561

A MEMBER OF THE *Sinms* GROUP OF COMPANIES

HIGH TENSILE

TUFSTRAP

FLEXIBLE STRAPPING TAPE

Maximum possible tension
without damage to container.

4 Cartons, total weight 2 cwt.,
suspended on one length
 $\frac{3}{8}$ " Tufstrap.

Weatherproof—stays
tight under all transit
conditions. Tested for
use in deep freeze
conditions.

No disposal problem
for your customer.



STOP PRESS!
Equipment now avail-
able on rental terms
including service and
maintenance.
Details on request.

However you pack, on pallet, in carton,
bale, plywood box, parcel or unit load,
TUFSTRAP STRAPPING TAPE is the best
means of closure and reinforcement.

STRONGEST FLEXIBLE STRAPPING TAPE KNOWN
 $\frac{3}{8}$ " WIDTH — 430 lb. BREAKING STRAIN
 $\frac{1}{4}$ " " — 290 lb. " "

TUFSTRAP EQUIPMENT

SHERWOOD STRAPPING TOOL

New design one-piece lightweight tool
with novel method of tensioning, ensuring
a really tight strap on packs of any size,
shape or type. Standard Tool for $\frac{3}{8}$ " width
(also suitable for use with Quikstrap
Strapping Tape up to $\frac{1}{2}$ " width). Little
John Tool for $\frac{1}{4}$ " width.

TUFSTRAP DISPENSER

New floor dispenser for all
widths of strapping, incorporat-
ing an automatic brake to
prevent overrun, at the same
time permitting simple and
easy feeding of the strapping
from the dispenser



MAIL COUPON TODAY

To: P. P. PAYNE & SONS LTD. Haydn Rd., Nottingham, England.

Please send me further information ☐

Please arrange for a free demonstration
in our Packaging Department ☐

Please tick item in which you are interested.

Name _____ Position _____

Company _____

Trade _____

Address _____

Post in unsealed envelope for 2d.

Code No. TUF.ER.

P.P.PAYNE & SONS LIMITED • HAYDN RD • NOTTINGHAM • ENGLAND

WHO'S WHO IN PRECISION CASTING

The many roles that Rawlings play in
precision casting makes for a programme
of industrial achievement as memorable
for variety as it is for quality. From a
foundry equipped for pressure and
gravity work in zinc and aluminium alloys
Rawlings castings have played an im-
portant part in the end-products of
nationally known manufacturers for
over 20 years.

RAWLINGS IS THE NAME TO REMEMBER



Pressure Castings in zinc to 6 lb.
Pressure Castings in aluminium alloy to 1 lb.
Gravity Castings in both alloys



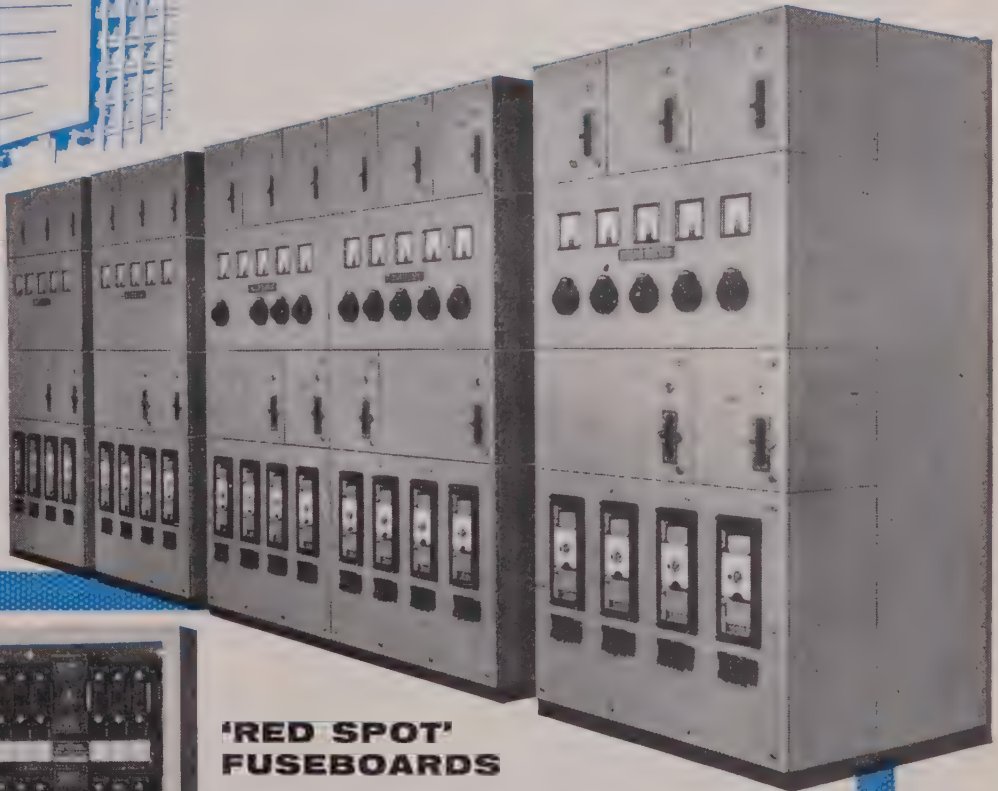
FOR MODERN BUILDINGS

The continual increase in the use of electric power consuming devices in all types of buildings calls for well designed distribution equipment of proved performance. 'ENGLISH ELECTRIC' meet these requirements with their 'Superform' Switchboards and 'Red Spot' Fuseboards.

**EASY TO INSTALL • EASY TO MAINTAIN
SAFE TO OPERATE • OF PLEASING APPEARANCE**

'SUPERFORM' SWITCHBOARDS

These switchboards have all the 'live' metal insulated, including busbars, interconnections, cable terminations, instrument and meter terminals, switch contacts and terminal blocks. Thus spare switches included on the switchboard can be cabled up safely with the existing circuits in operation.



'RED SPOT' FUSEBOARDS

Designed with concealed hinges and push button door catch having provision for locking by means of a built-in cylinder lock, 'Red Spot' fuseboards have the busbars and incoming cable sockets fully insulated. The fuse contacts and fuse terminals are covered by insulated shrouds. These features provide safety to electrical personnel by enabling spare fuseways to be cabled up with the busbars alive.



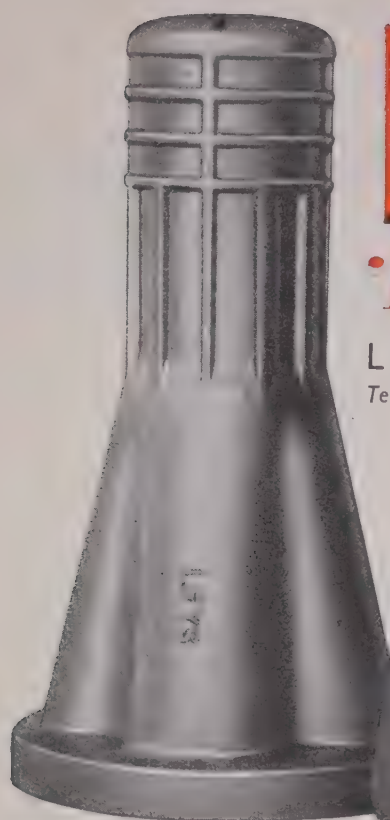
FOR DESCRIPTIVE LITERATURE WRITE TO:

The English Electric Company Limited,
Fusegear Division,
East Lancashire Road, Liverpool, 10

'ENGLISH ELECTRIC'

fusegear

THE ENGLISH ELECTRIC COMPANY LIMITED, ENGLISH ELECTRIC HOUSE, STRAND, LONDON, W.C.2
WORKS: STAFFORD • PRESTON • RUGBY • BRADFORD • LIVERPOOL • ACCRINGTON



LEY'S

'Black Heart' Malleable

LEY'S MALLEABLE CASTINGS CO. LTD., DERBY

Telephone: DERBY 45671

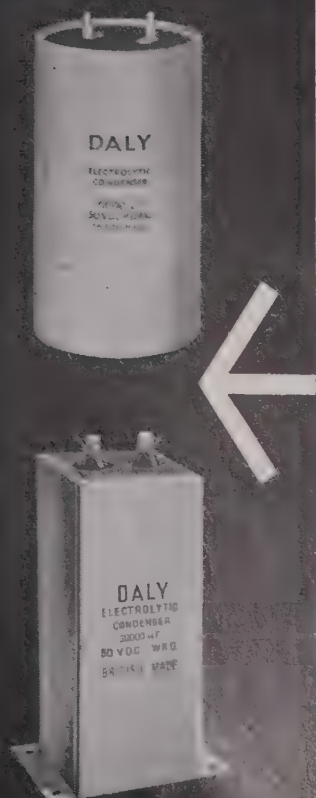


**Strength
Ductility**

DALY

ELECTROLYTIC CAPACITORS

Daly have specialised in the manufacture of electrolytics for over 20 years. Recent developments in the lower working voltages associated with transistors have greatly increased the capacitance obtainable in a given physical size—over 30,000 microfarads are possible in a single unit. Daly are always ready to design for special requirements; they make aluminium electrolytics of all types.



DALY electrolytics for transistorised equipment • for telecommunications • for radio and television receivers • for miniaturised equipment • for pulse and storage circuits • for capacitor start motors, etc.

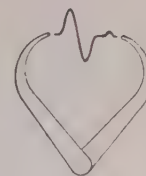
Send for descriptive leaflets!

DALY (Condensers) LTD.

WEST LODGE WORKS, THE GREEN, EALING, LONDON, W.5.

Phone: Ealing 3127-8-9

Cables: Dalycon, London



THE TEMPERATURE CONTROLLERS, SATURABLE RE-
ACTORS AND RESISTANCE THERMOMETERS USED IN
THE CREEP TESTING LABORATORY OF THE ELEC-
TRICAL RESEARCH ASSOCIATION AT LEATHERHEAD

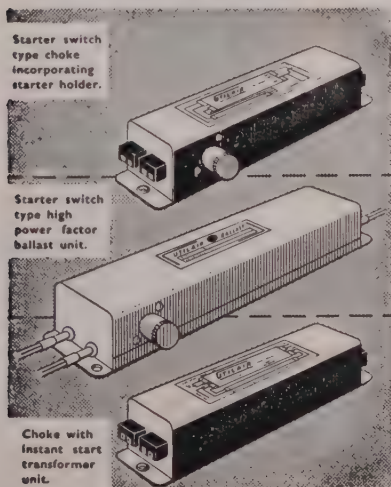
are by

C.N.S. INSTRUMENTS LTD.
61-63 HOLMES ROAD
LONDON, N.W.5
GULLiver 2418

SPECIALISTS IN PRECISION TEMPERATURE CONTROL



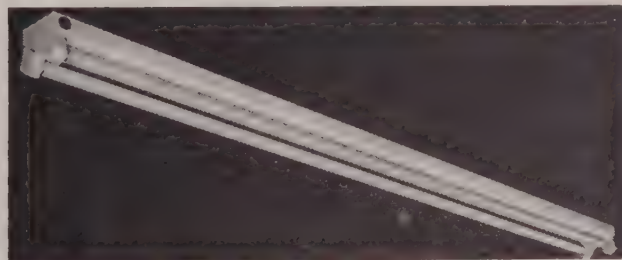
**BRITAIN'S BEST
FLUORESCENT LIGHTING
FITTINGS & CONTROL GEAR**



Britain's best range
of Fluorescent Fit-
tings selected for
efficient lighting by
famous concerns
all over the world



Model EP.802 Suspended or ceiling fitting with opal fluted diffusing cover



Model D.2125 Twin 8ft. 125 watt batten fitting



Model VP.802 Industrial vapour-proof totally enclosed fitting

UTILITIES (LONDON) LTD.

Manufacturing Electrical Engineers

TUNSTALL ROAD • BRIXTON

LONDON • S.W.9

Telephone : Brixton 6811-4

Telegrams : Utilon, London, S.W.9

get your portable electric tools the easy way...ring

Nettlefold & Moser - first

We can give prompt delivery
from stock of all **WOLF**,
BLACK & DECKER, **BRIDGES**
and **KANGO** equipment.



NETTLEFOLD & MOSER LTD.

Box 378, 170-194 Borough High St., S.E.1.

LONDON Tel: HOP 7111 (40 lines)

Dunnings Bridge Road, Bootle 10, Lancs.

BOOTLE Tel: AINTREE 4171 (6 lines)

201 Sculcoates Lane.

HULL Tel: HULL 41341 (3 lines)

Eighty-Ninth Year of Publication

Managing Editor:

HUGH S. POCOCK, M.I.E.E.

General Editor:

J. H. COSENS

Technical Editor:

A. R. POLLARD, A.M.I.E.E.

Iliffe Electrical Publications Ltd.

Managing Director H. S. Pocock, M.I.E.E.

Dorset House Stamford Street London SE1

Telephone Waterloo 3333

Telegrams Elecrev London-SE1 Code ABC

Please address correspondence to Editor, Advertisement Manager, or Publisher, as appropriate. Published weekly (Fridays). Registered at the General Post Office as a Newspaper. Entered as Second Class Matter at the New York, U.S.A., Post Office. Price: 1s 6d per copy. Annual Subscription: Home £4 0s 0d; Overseas £5 15s 0d; U.S.A. and Canada £16.00. Remittances payable to "Electrical Review."

© Iliffe Electrical Publications Ltd. 1961. Permission in writing from the Editor must first be obtained before letterpress or illustrations are reproduced from this journal. Brief abstracts or comments are allowed provided acknowledgment to the journal is given.

ELECTRICAL REVIEW

Friday 7 July 1961 Volume 169 No 1

IN THIS ISSUE

1 Electrical Installation Courses

A new course on modern electrical installation techniques was held recently at Twickenham Technical College. Some of the points raised in a discussion on the pattern of the course are commented upon

3 Rolling Mill Control

The author, Mr. D. W. Prowse, describes the nature and arrangement of the main drives and the technique of control employed in connection with the new 144in aluminium plate mill at the Rogerstone Works of Alcan Industries, Ltd.

10 Progress at Trawsfynydd

Steam-raising equipment for the 500 MW nuclear generating station being built for the C.E.G.B. in North Wales by Atomic Power Constructions, Ltd.

13 E.R.A. Creep Laboratory

A new laboratory has been opened this week at the Leatherhead premises of the Electrical Research Association. This laboratory will be concerned with the creep and rupture properties of high-temperature steels used in modern thermal power stations, and the work will be devoted to long-term tests

21 Judgment in E.T.U. Case

In a reserved judgment in the High Court, Mr. Justice Winn found that five of the defendants had conspired together to prevent "by fraudulent and unlawful devices" the election of Mr. J. T. Byrne as general secretary in December, 1959

30 Soviet Engineering at Earls Court

An impressive display portraying the development of the U.S.S.R. economy is to be seen at Earls Court, London, where the Soviet counterpart of the British Trade Fair in Moscow opens today

37 New Semiconductor Factory

The new Texas Instruments' plant at Bedford was officially opened last week by Sir John Cockcroft. It is principally concerned with the production of silicon semiconductor devices

NEWS SECTIONS

15 Light Control

17 Views on the News

18 Personal and Social

23 Industrial News

28 New Electrical Equipment

31 Industry and the House

33 Transport Report

34 Financial Section

39 New Patents

39 Next Week's Events

40 Contract Information

95 REGIONAL GUIDE TO ELECTRICAL CONTRACTORS

99 CLASSIFIED ADVERTISEMENTS

110 INDEX TO ADVERTISERS

Supplement: Electric Fires—Inside Back Cover

VACTITE

HEATING ELEMENT

WIRES are being used in
a wide range of domestic
electrical appliances such as ...

Domestic electrical appliances of many kinds depend upon the highest quality of element wire that is obtainable. The "Vacrom" and "Eureka" range of wires are the products of years of research and experience, which enables such a quality to be attained.

Vacrom 80/20 is used extensively for electric heating elements, and is available for operation at temperatures up to 1150°C. indefinitely.

Eureka cupro nickel is also used as element wire in applications requiring temperatures in the range up to 300°C., but more especially when the resistance value of the element must remain stable under conditions of temperature fluctuation.

**ELECTRIC FIRES
& RADIATORS**

**ELECTRIC IRONS
TOASTERS-KETTLES**

**TUBULAR SPACE
HEATERS**

**WATER-IMMERSION
HEATERS**

**ELECTRIC TOWEL
RAILS**

**ELECTRIC
SOLDERING IRONS**

**ELECTRIC BLANKETS
ETC. ETC.**

ELECTRICAL REVIEW

7 July 1961

Vol. 169

No. 1

Established 1872

Electrical Installation Courses

THE electrical installation contracting industry, like many others, is subject to conflicting requirements. There is a need to absorb new ideas, yet some new techniques can seem unattractive to the lower orders of craftsmen because much of what is regarded as traditional skill is not needed. Furthermore, innovations are often regarded with some suspicion. It is known that any material or equipment has a definite economic life and until the new development is proved by experience, some lack of confidence is bound to exist. One unfortunate corollary of this is a tendency towards increasing the price for a contract if the technique or material being used is new, presumably to guard against any unfortunate contingencies.

More instruction in new techniques directed specifically at the user is probably the quickest way in which to improve this situation, and a new venture which has just been successfully undertaken by Twickenham Technical College in the form of a two weeks' specialist course in electrical installation techniques should help considerably. This topic is, of course, dealt with in varying degrees as a subject in a number of courses and there have also been series of evening lectures dealing with this and kindred subjects, but it is thought that this was the first full-time residential course in installation work intended for more senior engineers and executives in the contracting and associated industries. The fact that the course was over-subscribed indicates the need which existed for it and others of its kind, and this is supported by the appreciable number of those attending who were prepared to do so wholly or partially in their holiday period.

It is a sad reflection on the employers in this branch of the electrical industry that this should be necessary. Installation contracting work is not just the simple wiring job that it is all too often thought to be, and new techniques, components and fairly complex items of electrical and occasionally electronic equipment are continually having to be understood and then employed. No industry, whatever its nature, can afford to neglect technological developments, and its employees must be given every opportunity of receiving adequate instruction. Contractors, it has been said, are reluctant to release staff for further education as there is then the risk that these people would naturally seek better jobs elsewhere. Apart from the fact that making ready release a general practice would automatically eliminate this possibility, the contingency is unlikely to arise in the case of more senior staff for whom this course was intended.

Since it was a new course the syllabus had to be of a somewhat experimental nature. Nevertheless, the pattern adopted (outlined on page 1166

of last week's issue) of lectures on installation requirements and design, protection systems and testing, heating, and lighting, supported by practical sessions and inspection of large electrical installations, was generally approved. Some suggestions for improvements were made, however, and they are of interest as they may presumably be regarded as indicative of the requirements of a large section of the industry. The principal need, not surprisingly, was for more practical treatment of installation design and testing, but there were also strong demands for papers on such aspects of contracting work as estimating and costing, the preparation of specifications, site control and legal matters. For most of these, however, it had proved impossible to find contractors willing to impart the desired information.

It is a pity that the inclusion in such a course of a lecture on architecture and building is not often reciprocated by the architects, who in many cases seem unaware of the difficulties facing the electrical people. Discussion periods were also advocated, as a number of extra-curricular subjects were raised, from training apprentices to the relationship between main contractors and sub-contractors. It was emphasised that these suggestions were in no way criticisms but reflected a desire for additional coverage of the subject. Doubtless the authorities at the College will give them close consideration in their plans for future courses which unquestionably must be held.

HIGH TEMPERATURE METALS

The temperature and pressure of steam used in power stations and chemical plants has increased considerably over the last few decades and has necessitated a close investigation into the various mechanical properties of metals at high temperatures. One of the most important investigations is concerned with the continuous deformation, or creep, of these metals under steady load. Since high temperature steels are expensive, they must be used sparingly and thus a knowledge of long-term creep properties becomes an important aspect of the design.

Since 1930, the National Physical Laboratory has been investigating the high temperature behaviour of certain typical steels. This work included creep testing, but it soon became evident that short-term testing was not sufficient and periods of test had to be extended to times of the order of 20,000 hours or more. This enabled an accurate knowledge of stresses that could be withstood over a long period of time to be taken into account in the design of power station plant, which is assumed to have a life of about 20 years.

In recent years, steam conditions have become even more onerous and the number of special creep resistant alloys has also increased. As a result the N.P.L. could no longer cope with the extended test programme, even though it had been reinforced by further test facilities at the E.R.A. Laboratories in 1957. It was therefore decided that a new laboratory should

be built for the E.R.A. at Leatherhead, devoted principally to long-term creep tests. The work now being carried out in the new laboratory is described in an article in this issue, and the results of this work will undoubtedly lead to more economical designs of power station plant.

RESULTS OF APATHY

As might have been anticipated after the evidence given in the case brought against officials of the Electrical Trades Union by two members of that Union, Mr. Justice Winn dealt severely with the defendants in his judgment. He quite rightly stressed that Communists were not proscribed in this country and the election of Communists as their leaders was the affair of the members. What was wrong was that the Union had been made a tool of the Communist Party and that the defendants had conspired to prevent by "fraudulent and unlawful devices" the election of the plaintiff, Mr. J. T. Byrne, as general secretary in place of Mr. F. L. Haxell, a Communist and one of the principal defendants.

Mr. Justice Winn showed that the Communist element in the Union was very small but by its intense activity it had managed to dominate the Union's affairs. In other words, the generality of the membership, through apathy or indifference, had enabled a minority to rule. It may be that they were content so long as the Communist-controlled executive council obtained results in the shape of better wages and conditions, but it is still extremely reprehensible that they should have allowed control to remain so long in the hands of the people now condemned by a judge in such strong terms. This case will have done some good if it induces the members of the E.T.U. and trade unionists generally to take more interest and care in the choice of their leaders.

NUCLEAR POWER PROGRESS

British manufacturers are certainly putting up an impressive performance in the construction of nuclear power stations in this country. Considerable progress has been made since work on the first of the civil stations began, and by the end of this year the first two of these should be in commission. These stations are being built in the face of many difficulties, mainly due to the fact that so many new techniques have had to be developed in this new field combined with relatively inaccessible sites.

In this issue we describe some of the work which is being done at Trawsfynydd. This station, the only inland nuclear station under construction in this country, derives its cooling water from the nearby Trawsfynydd Lake, which is in the remote and mountainous region of North Wales. The problems of transporting heavy equipment to the site have been considerable but despite this there seems no doubt that the station will be completed according to programme.

ROLLING MILL CONTROL



By
D. W. PROWSE
B.Sc., A.M.I.E.E.*

The 144in aluminium plate mill at the Rogerstone works of Alcan Industries, Ltd., is completely electrically controlled from the time the ingot leaves the pre-heating furnaces, through the rolling process, to the final shear. The author describes the nature and arrangement of the main drives and the techniques of control which are employed

WITH the increase in use of aluminium plates and the prospect of further expansion, Alcan Industries, Ltd., decided to install a 144in plate mill at its Rogerstone works. The whole of the electrical equipment was supplied by Associated Electrical Industries (Rugby), Ltd., while the Davy & United Engineering Co., Ltd., supplied the mill under a separate contract. The electrical equipment drives and controls all operations on the aluminium ingot from the time it leaves the pre-heating furnaces, through the rolling process, to the shear, where the piece is cut up to the required length. It is then either passed on to a 96in mill for further rolling and coiling or is removed as a completed plate.

In an installation such as this where both the main and auxiliary drives are supplied by one manufacturer a great deal of standardisation can be achieved both of parts and control schemes. This has advantages to the customer from the point of view of spares, but it also enables the comprehensive schemes to be more readily understood.

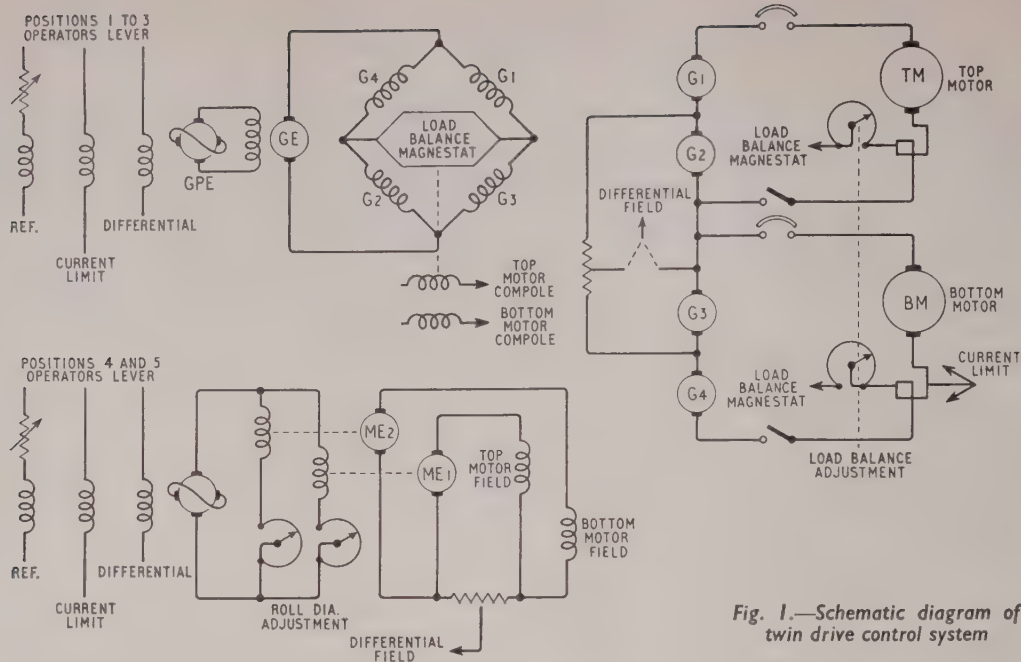
Collaboration between A.E.I. and Davy & United enabled a common change-over control scheme for all the lubrication systems to be agreed for both the mechanical and electrical auxiliaries.

With the large number of d.c. drives steps were taken to restrict the number of types of magnetic amplifiers which were required. For most of the control systems a common magnetic pre-amplifier is used with either of two output stages. These same amplifiers are used for the hot coiler controls of the finishing mill. Besides the main drive there are several d.c. auxiliary drives, namely the feedrolls, main tables, turntables, screwdowns, shear, roll change rig, and solenoid controls for mill side-guides, down tilter, etc.

Mill Motor Control.—The plate mill is driven by two 4,000 h.p., 30/60 r.p.m. motors with working peaks of $2\frac{1}{2}$ times full load current, but arranged to cut out at three times full load current. Each motor is connected to the separate work rolls by spindles and are only connected together mechanically when metal is between the rolls.

The top and bottom roll motors are each controlled by

* Associated Electrical Industries (Rugby), Ltd.



two generators in series in two separate Ward Leonard loops as shown in Fig. 1. The generator fields are connected in a bridge arrangement with the main control power being supplied by one generator exciter GE. Across the opposite arms of the bridge is connected a load balance magnestat LBM which trims the generator field excitation depending on the two armature loop currents, as described later.

To obtain the necessary forcing to enable rapid changes to be made in generator voltage, the generator exciter GE has a large ceiling output compared with the steady-state voltage required when the generators are at their full voltage. To utilise this peak exciter output the generator exciter GE is controlled by an amplidyne exciter GPE. The inputs to the amplidyne are : —

- (1) The main reference controlled by the operator's lever.
- (2) A differential voltage from the generator which opposes the reference.
- (3) An over-riding current limit winding connected to protect the mill motors against excessive current.

The mill operator, seated at a desk in the mill pulpit, controls the generator voltage by means of a hand-operated master controller with movements over the first three notches both forward and reverse. This controls the mill motor speed up to the base speed of 30 r.p.m. To increase the mill motor speed still further into the field-weakening range, the mill operator has two further positions each side of the "off" position of the master controller. These positions control the mill motor field currents through another closed-loop regulator.

As the master controller is moved from position 3 to position 5, the reference signal in the amplidyne (Fig. 1) is reduced. This causes the amplidyne voltage to reverse thereby reversing the voltage of the motor field exciters ME1 and ME2 (these machines are duplicates of the generator exciter GE). The large negative voltage from the motor exciters forces the field current to reduce rapidly from its full field value to the weak field value. When the

field current approaches its final value the differential feedback from the field current cancels the reference signal and the motor exciters ME1 and ME2 settle to the weak field voltage values. Over-riding current limit is available to prevent the motor fields from being weakened if the rolling loads cause excessive armature current.

Two other signals (not shown) are provided in the motor field circuits to restrict the forcing of the motor field when the operator reduces the speed of the mill in the region 60 to 30 r.p.m. This restriction in forcing when strengthening the motor field is necessary to prevent large current surges in the armature circuit which could occur if the motor field currents changed too rapidly near the weak field value.

Load Balance Control.—Provided the motor fields and generator voltages are set within close limits the mill motors will share loads quite well. However, it is usual to provide a load balance system to control the armature currents and to help shape the metal when it is rolled.

The load balance control on this mill adjusts the generator fields as indicated in Fig. 1. The volt drop across the compole and compensating windings of the two motors are compared. If equal armature currents are required, any difference between these two signals causes an output from the load balance magnestat in a direction to decrease the voltage of the generators with the higher current and increase the voltage of the generators with the lower current. By controlling the generator fields rather than the motor fields a faster response is obtained and the system responds similarly at all voltages. If the control were on the motor fields any changes in the motor field currents when the motors were at standstill would be ineffective.

Sometimes, for the purpose of causing the front of the ingots to turn up or down, the armature currents are required to be unbalanced. For example, when rolling aluminium the mill operator prefers the front of the ingot to turn down slightly as it leaves the mill. By turning the load balance adjustment rheostat (which is mounted on the



View of the mill from pulp control desk

operator's desk) away from its central position, resistance is inserted into one of the control circuits of the load balance magnestat and cut out in the other. Thus, equal signals are obtained from the motors to the load balance magnestat when different armature currents are flowing. To help to get the turn down required on the front of the ingot, the load balance should be set to obtain a higher current in the top motor.

Another adjustment provided, this time in the motor fields, was for roll diameter. One rheostat is provided for each motor field and is mounted on the right-hand side of the operator's desk along with the load balance rheostat. The unbalancing of the motor fields is achieved by adjusting the current in the field windings of the motor exciters as indicated in Fig. 1.

By unbalancing the motor fields it is possible to adjust the motor speeds to obtain the required peripheral speed of the rolls before the piece enters the mill. Again, in order to help the turn down required on the piece, the roll diameter adjustment is set to give the top roll a slightly higher peripheral speed than the bottom roll.

Ilgner Set Control.—The generators supplying the mill motors are part of an Ilgner set with a 28 ton, 12ft diameter flywheel which is driven by an 8,000 h.p. induction motor. The stored energy in the flywheel is used to smooth out the rolling peaks on the supply system. The driving motor is controlled by a liquid slip regulator, the electrodes of which are driven by a small d.c. pilot motor with split series fields. This motor is controlled by a push-pull magnetic amplifier position servo with over-riding current limit. The control scheme is as shown in Fig. 2.

The position reference is applied through raise and lower contactors. To accelerate the Ilgner set, the lower contactor is energised, applying a position reference to drive the electrodes to the short-circuit position, the pilot motor being supplied by one of the push-pull magnetic amplifiers. The position feedback is obtained from a voltage selsyn.

The electrodes move towards the short-circuit position,

starting the set, and the stator current of the induction motor is allowed to rise to approximately $1\frac{1}{2}$ times full load current. At this current a signal from a current transformer in the stator circuit exceeds a current reference. This permits the position reference current to "spill over" through a rectifier and by-pass the magnetic amplifier control winding. The electrodes slow down but continue to move slowly, reducing the rotor resistance and allowing the Ilgner set motor to accelerate at $1\frac{1}{2}$ times full load current. The inertia of the Ilgner set is such that it takes $1\frac{1}{2}$ min to get the set up to speed.

During rolling, if the load on the mill motors is such that the required power from the supply exceeds $1\frac{1}{2}$ times full load current on the Ilgner set motor, the current limit circuit in the liquid slip regulator control produces a signal to drive the electrodes up and increase the driving motor rotor resistance. The set thereby slows down, giving up some of the energy stored in the flywheel. When the rolling load is reduced, the Ilgner set accelerates once more and restores the flywheel energy.

To stop the Ilgner set an automatic dynamic braking system is used. The main breaker supplying the driving motor is tripped and d.c. is fed to the motor stator through a braking oil switch which is mechanically and electrically interlocked with the line oil switch. The dynamic braking supply is obtained from the generator exciter GE.

During dynamic braking the electrodes are raised to the maximum resistance position at the same time as the dynamic braking current is supplied to the stator. As the Ilgner set slows down, the electrodes are automatically driven to a low-resistance value where they are stopped. During the time the electrodes are moving towards their final resistance value the Ilgner set is slowing down. The remaining rotor resistance is of a value to give a high average braking torque over the last 30 per cent of the speed range before the set comes to rest. With dynamic braking the Ilgner set is stopped in about 1 min 40 sec, but if the set is allowed to coast to rest the time is about $1\frac{1}{2}$ hr.

Feedrolls

The feedrolls situated on each side of the main rolls feed the material into the mill. They are individually driven by direct-coupled mill type motors. The feedrolls are

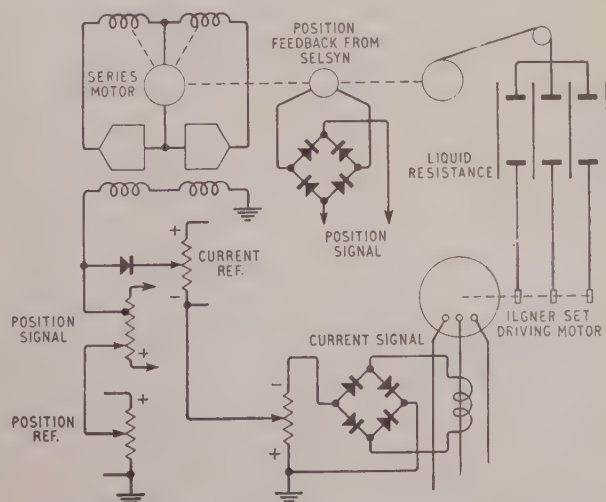
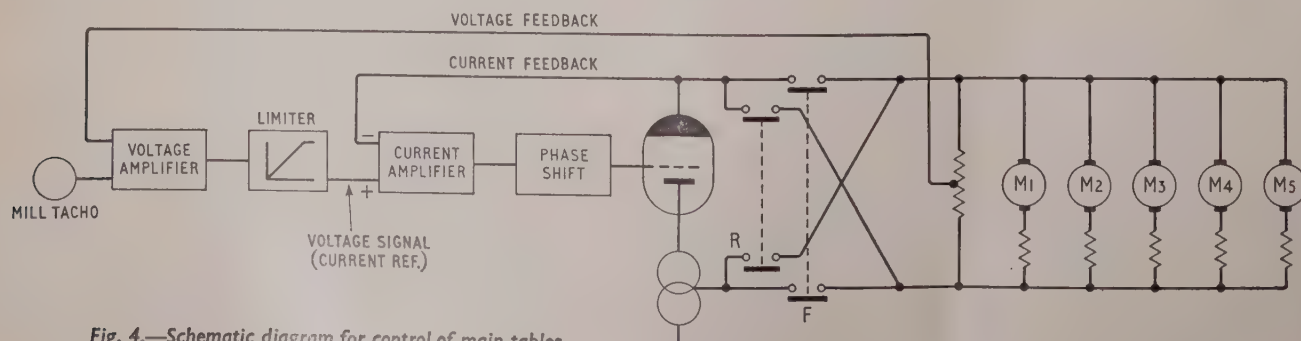
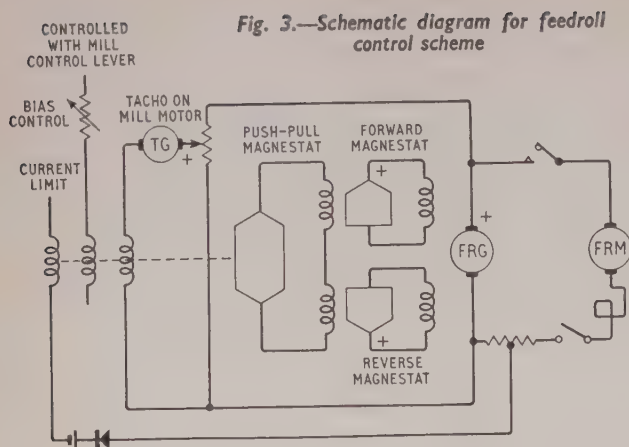
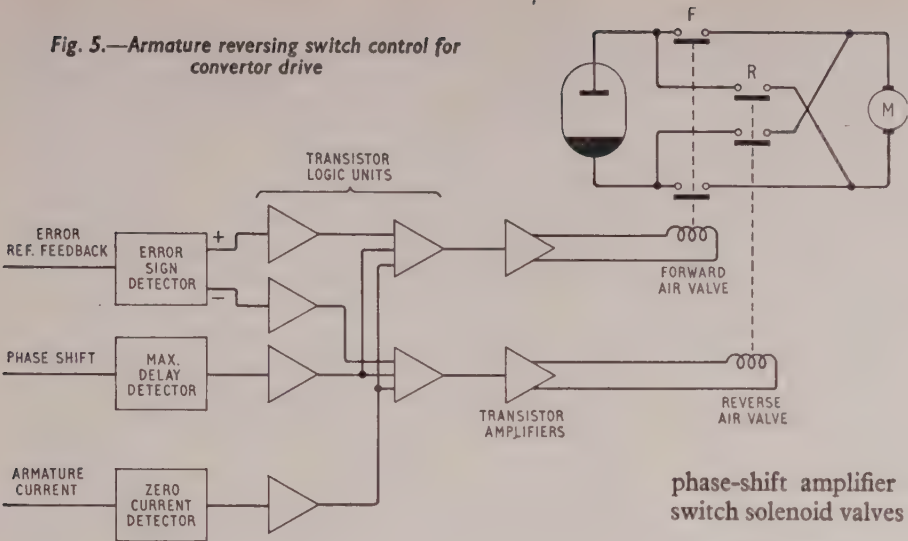


Fig. 2.—Schematic diagram of liquid slip regulator control scheme





conditions of rectifying and inverting means: positive error is required to increase the output of the phase-shift amplifier to reduce the grid delay of the convertor when rectifying; negative error is required to increase the output delay of the convertor when inverting. To obtain the correct output stage, the voltage amplifier is switched by interlocks on the armature-reversing switch. The logic circuit shown in Fig. 5 ensures that the reversing switch is in the correct position.

Referring to Fig. 5, the error is supplied to a transistor circuit which supplies one or other of the transistor logic units, depending on the sign of the error. This signal decides which air valve should be operated. Two further inputs are incorporated as permissive signals. These come from armature current and phase-shift amplifier output. Before a switch operation is allowed these signals have to indicate that the armature current is zero and that the convertor grids are retarded into the inversion region. The transistor logic units are of the "NOR" type suitable for three inputs. An output is only present when all inputs are switched off, i.e. they are analogous to three normally closed contacts in series.

Protection and Maintenance

The amplifier units are split into sections which could be easily removed and the "NOR" units are potted so that they plug into a standard octo valve base. A special monitoring feature is also incorporated. Inside the convertor control cubicle is a test switch and three rotary potentiometers. When on "test" these three potentiometers can simulate the three signals for error, armature current, and phase-shift current. By operating the potentiometers it is possible to check the locking feature of the armature current and phase-shift current signals and also to check readings at each stage of the logic circuit on monitoring meters.

A further protective feature incorporated is a relay connected between the two outputs of the transistor amplifiers supplying the forward and reverse air solenoid valves. This relay is normally energised because one or the other of the air valves is energised. If, however, a fault occurs in the transistor system which causes both or neither of the transistor amplifiers to be energised, the relay will drop out. It is arranged to trip the high-speed circuit-breaker

in the armature loop. The switch is also designed so that it will not change over unless one valve is energised at a time in order to protect against power failures, etc.

To guard against any failure which might cause the reversing switch to get a change-over signal when armature current is flowing, further interlocking is provided between the amplifiers operating the solenoid valves of the reversing switch and the phase-shift amplifier. This circuit ensures that the

phase-shift amplifier is phased back when the reversing switch solenoid valves are operated.

Turn Tables

The turn tables are situated on each side of the mill next to the feedrolls. These tables are about 50 per cent wider than the other tables and include split rolls with separate driving motors on each side. The split rolls are operated at different speeds in order to turn the piece when necessary during the rolling sequence.

The turn tables are driven by 75 h.p. mill type motors and are normally supplied with the other table motors from the converters. To give the different voltages required for the turning action a booster is connected in series with each motor as shown in Fig. 6. When the tables are used to turn the piece the booster voltages are controlled by a lever on the operator's desk next to the main control lever. The boosters are excited with voltages of opposite polarity through two stages of magnestats. The control

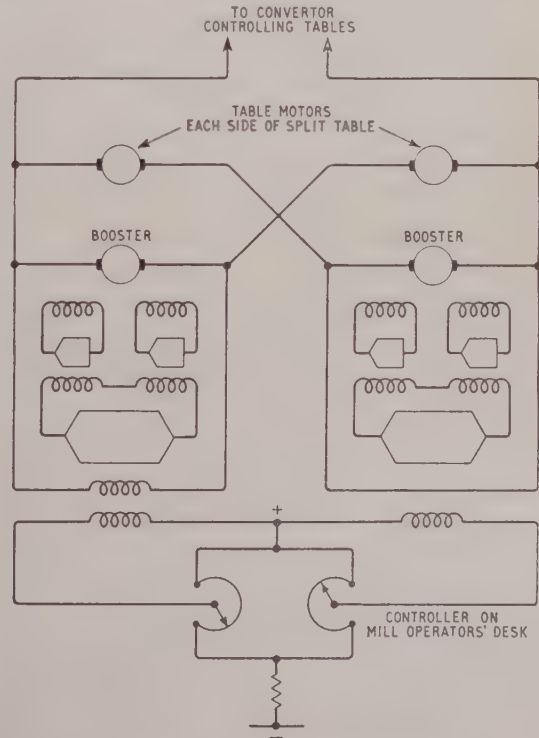


Fig. 6.—Turn table control

system is simple and no current limit signal is provided. The magnestats enable small rheostats to be mounted in the desk to supply the booster reference.

Screwdowns

The screwdowns control the gap between the rolls and hence the reduction in the metal when it is rolled. For a hot reversing mill the change in roll gap must be rapid and on this mill a movement of up to 2 in is the normal requirement. The screwdown on this mill has a top speed of 50 in/min and is designed to operate from a controller on the left-hand side of the pulpit desk. A future requirement is that the screwdowns will be operated by a position control servo, the roll gap being set manually or by automatic programming. The screwdowns at the moment, however, are controlled by a voltage closed-loop system.

The screwdowns are designed for two requirements. When the mill is used as a roughing mill for the hot line the full speed of 50 in/min is required. When rolling plate, however, a lower speed is required to enable the operator to screw down on to the metal when it is being rolled. For this a second screwing speed is available with a maximum speed of 1 in/min. In order to change from one screwing speed to another a control selector switch is mounted on the operator's desk. This switch controls two actuators, one on each screw box, which bring in an extra gear reduction when the low screwing speed is required.

The double screwing speed produces a screwdown with a very large inertia. This is because such parts as the main worm spur have been made to withstand the large torques available when screwing on to metal, but also have to rotate at high speed when a high screwing speed is required.

To enable the screwdowns to have the fast response required, the screwdown generators are designed to give very large peak outputs (over three times full load current) to supply each of the 200/400 h.p. screwdown motors. To obtain the necessary forcing peaks on the generator fields a generator exciter is also provided.

A push-pull magnestat supplies the two output magnestats which are connected to the two separate fields on the screwdown exciter. For normal steady-state outputs both the exciter and the magnetic amplifiers are operating at very small outputs compared with their maximum values. Current limit is provided in the normal way to protect the screwdown motors against severe overloads.

Special illuminated selsyn type screwdown indicators are provided in the operator's pulpit. These are mounted in front of the desk at floor level and there are two for each screwdown. One is for normal operation with two pointers scaled 0-40 in and 0-1 in and the other is a fine indicator for plate rolling scaled 0-0.1 in. Each pointer is operated by a separate selsyn.

Shear

On the outgoing side of the mill is an upcut shear designed to cut up to 4 in thick plate. It is driven by two 400 h.p. motors through a gearbox. The operation is cyclic. To start the shear the operator turns the shear cut switch to the "cut" position. The shear accelerates at full speed before the cut commences. If during the cut the torque required is greater than the current-limit setting on the motors, the shear motor speeds are reduced and the drive gives up some of its kinetic energy. This increases the available torque at the motor shafts. After the cut the motors accelerate to full speed again before being slowed down and are stopped automatically by cam-limit switches driven by the shear. The control system is the same as that for the screwdowns. The exciter and the magnetic amplifiers are the same but the generators are different, each being designed for its different special duties.

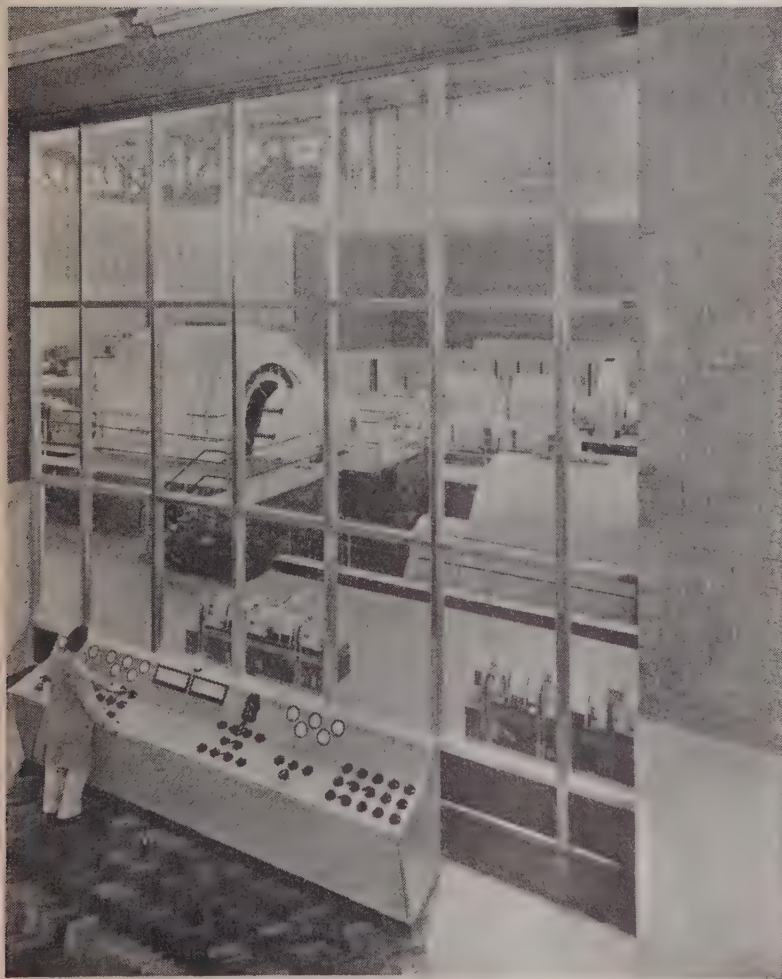
Roll Change Rig

The roll change rig is operated by a 75 h.p. mill type motor with contactor control. The motor operates the carriage which draws out the nest of rolls in the main mill. The carriage moves on a slide and the motor is designed for a large breakaway torque. Special greasing systems are incorporated to reduce the sliding friction to the minimum. The motor is controlled from a separate control station at the roll change pit.

Solenoid Controls

A number of the auxiliary drives supplied by Davy & United are hydraulic. The control for these was supplied by A.E.I. and forms part of the main d.c. panel.

The most important of these are the side guides which square up the metal before it enters the mill. The side guides perform two main functions. They can either be used as centring pushers, when they move into a piece after



Supervisory control desk with view of main drive motors

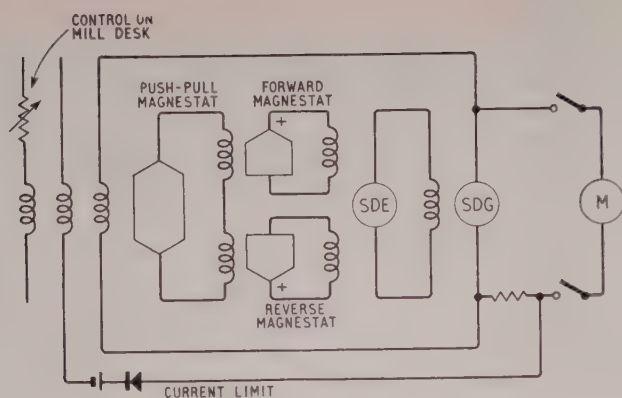


Fig. 7.—Screwdown control

it has been turned to square it up, or they can be used as guides. Under the latter condition the side guides are brought to within a few inches of the metal as it enters the mill to make sure it enters squarely. A further set on the exit side of the mill are required when the mill reverses, but these must not be brought into position until the mill stops. This is to prevent the metal being rolled from smashing against the end of the side guides on the outgoing side. To limit the time required to bring the side guides up to the metal when the mill reverses an automatic short-stroking action is employed. When set to "automatic" the side guides on the outgoing side of the mill move out about a foot each side of the metal as it is being

rolled. When the mill reverses the side guides on the now ingoing side move in while the others move out.

Other hydraulic controls are supplied for such drives as the down tilter, which lowers the ingot on to the tables, and the crop pusher which clears the cut end from the tables at the shear.

Alarms

To enable faults to be found quickly a comprehensive alarm system has been installed. The system enables up to 60 types of faults on any of 13 sections of the drive to be registered. The main alarm system pushbuttons and facias are mounted on the supervisory desk in the control room. In the event of a fault a siren sounds and a lamp on the supervisory desk flashes. At the same time the "drive" pushbutton flashes. When the motor room attendant pushes the "drive" pushbutton the siren is silenced and the "type of fault" lamp flashed in the facia. On pushing the "accept" key the lamps become steady and the attendant can investigate the fault. If any further faults occur these too are registered and start the flashing lamp and siren again. A "reset" key has to be pressed when the fault is cleared to remove the fault indication from the alarm system.

A further set of alarms is provided on the supervisory cubicle in the mill oil cellar. Alarms which affect the mill are relayed to the mill operator's desk and the shear desk. Although these alarms do not necessarily mean that the mill will be stopped the operators are made aware that something is wrong and can prepare for a shutdown if the fault cannot be cleared.

Substation—Building or Structure ?

FROM A CORRESPONDENT

ELECTRICITY authorities who wish to make use of disused burial grounds and may in the past have been disturbed by the decision in the St. Nicholas Acons case will be interested in the recent case of St. Peter the Great, Chichester. In that case the Southern Electricity Board wished to take a lease of 99 years and the church authorities were prepared to give them a licence for 50 years of the churchyard in order to supply the needs of the neighbourhood. They could not get another site and were not desirous of using their compulsory powers. They wished to use the churchyard for a proposed substation. The substation consisted of (1) a low-voltage feeder pillar with doors and standing 4ft high; (2) a transformer constructed mainly of tubes and standing 6ft 4in high; and (3) high-voltage switchgear. The equipment was fixed to concrete rafts and cables laid to the roadway at a depth of no more than 2ft. The Court had no difficulty in saying that the erection of the substation would benefit the public generally and the parish and was not inconsistent with consecration. The only point at issue was whether it constituted a *building* as S.3 of the Disused Burial Grounds Act, 1884, prevents buildings being erected "except for the purpose of enlarging a church, chapel, meeting house and other places of worship."

The Court held that the substation was not a building

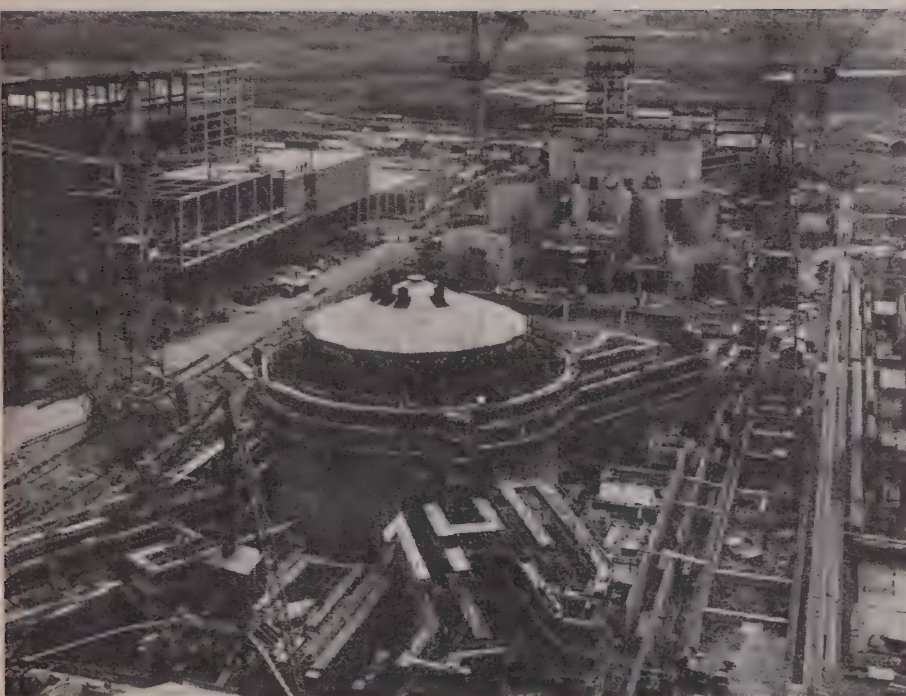
but a *structure*. In so doing they distinguished the decision in the St. Nicholas Acons case where a transformer chamber was held to be a building and that in re St. Mark's Church, Lincoln, where a 'bus station was also held to constitute a building even if it was erected partly outside the churchyard. Some guidance was given as to what is a building and in *Moir v. Williams* it was suggested that the term should apply to what is normally called a building, namely, "an inclosure of brick or stonework covered in by a roof."

VALVE BASES, CAPS AND HOLDERS

TWO more sections of B.S. 448, "Electronic Valve Bases, Caps and Holders," have just been published. They give dimensions for valveholders and for the gauges needed to ensure compatibility with the appropriate valves. Section B8D/3 applies to holders, and associated gauges, for valves having B8D eight-pin circular sub-miniature type bases. Section 7/3 applies to holders (and associated gauges) for valves having 5 or 7 lead-in-line bases. Copies of these sections, which are published separately, can be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 3s each.

Progress at Trawsfynydd

Good progress is being made with the construction of the 500 MW nuclear generating station at Trawsfynydd in North Wales. The station is being built for the Central Electricity Generating Board by Atomic Power Constructors, Ltd. This article deals primarily with the steam-raising equipment which is being manufactured by International Combustion, Ltd.



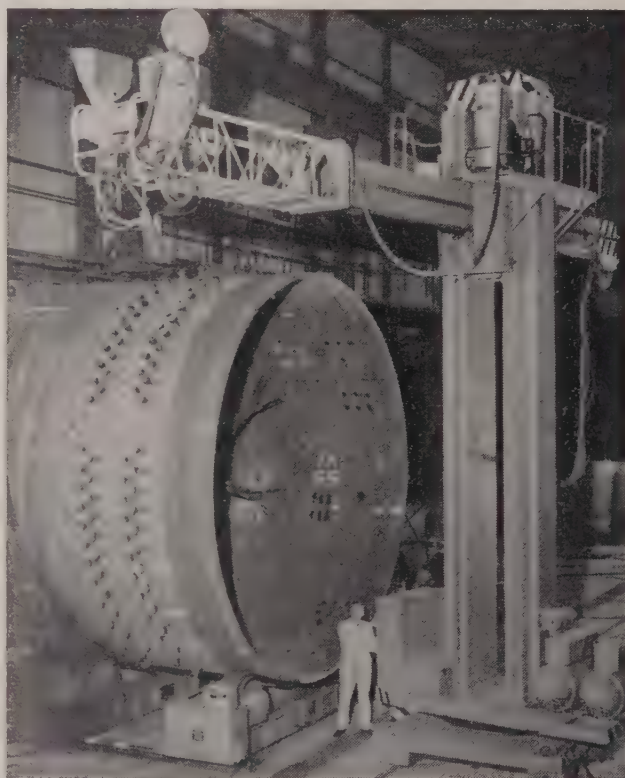
General view of Trawsfynydd reactor building areas

A FEW days ago we visited the Heavy Engineering Shop at International Combustion, Ltd., at Derby, where the pressure vessels are being made for Trawsfynydd nuclear power station. This shop has a floor area of 68,250 sq ft and was described in the *Electrical Review*, 1st May, 1959, shortly after it had been completed. It is divided into three bays, the centre bay being 75ft wide and each wing bay 65ft wide. The overall length is 350ft and the height from the floor to crane rails is 40ft. To provide additional headroom for the construction of very large diameter vessels, the centre bay contains a welding pit 150ft long by 25ft wide by 12ft deep. The floor of the pit carries manipulating equipment for rotating vessel sections during seam welding, and also provides an adequately screened space for X-ray examination in addition to the main X-ray and gamma-ray booths at the north end of the shop. Layout of machinery around the shop perimeter is suited to progressive stages of manufacture, each bay being served by two cranes, the heaviest of which is of 50-tons lifting capacity.

Raw material taken from the stock yard is transferred into the main shop through the flame planer building, where the plates can be cut to size or shape, and initial weld preparation formed on the plate edges. Further edge preparation for welding is carried out on either a large planer accommodating plates up to 35ft long or on a standard planer which has a table 25ft long. Circumferential weld preparation is undertaken on a large centre lathe or on a vertical boring machine.

Two vertical presses, each of 3,000 tons capacity, together give a range of plate bending in various widths from 3in thick (cold) at a minimum diameter of 3ft up to 4in thick (cold) at 25ft diameter. A four-column downstroking press of 2,000 tons capacity provides for the hot pressing of dished ends and segments for all diameters of vessels and drums. Lighter sections of plate are manipulated in the power rolls up to 1½in in thickness.

The principal machine is an automatic welder with a rising boom catering for vessels up to 12½ft in diameter and 50ft in length. These vessels are manipulated under the welding head by means of a roller bed installation. A



Boom welding equipment for circumferential seam welds. This machine moves along rail tracks seen in the foreground of the photograph, and also rotates on the turn-table provided above the base plate. The speed at which the shell manipulator rotates is adjusted according to welding requirements, and control of this manipulator and welding operations is exercised by the welder working in the cantilever portion of the welding head

number of other welding facilities of the self-propelled automatic type are used together with such standard direct current and alternating current sets as are required for the work in progress.

A group of three furnaces centralised at the south end of the shop provides for the heating of plates for dishing, and the heat treatment either of long medium diameter vessels or of large diameter sections of vessels. These are all town mains pressurised gas-fired furnaces, with fully automatic temperature control, and temperature recorded throughout the whole process. Two electrically-heated furnaces are also situated at the south end of the shop for stress relieving nuclear strake sections.

The largest machine installed is a vertical borer which can be adjusted for work on vessels up to 25ft in diameter, and provides for cylindrical edge preparation, general boring and facing. There is also a floor boring machine with a 3in diameter spindle. Tube hole drilling, and profiling tube stubs for welding, are catered for by a duplex horizontal boring machine.

After visiting Derby we went to Trawsfynydd to see something of the work which is being done on site. It will be remembered that the net output of the two natural uranium, graphite-moderated, gas-cooled reactors in this station will be 500 MW (electrical). Each reactor is contained in a spherical pressure vessel surrounded by a cylindrical biological shield, and is housed in its own separate reactor building. The graphite moderator has 3,720 vertical coolant channels, placed at 7½in square pitch. Constant-speed gas blowers circulate carbon dioxide at a pressure of 240 p.s.i. to six boilers situated on each side of the reactor in two lines of three.

The 12 boilers for Trawsfynydd are the responsibility of International Combustion, Ltd., and each is 18ft in



Boiler components on the final assembly beds preparatory to completing the whole boiler shell. Manipulating and boom welding equipment of a similar category to that already described is used for this operation

diameter and 109ft 6in in height. The total weight of the empty shell when complete is 350 tons. Due to the size of this vessel, it is necessary to perform an appreciable proportion of fabrication work in a shop built on site. However, for technical and economic considerations, it has been necessary to carry out the greatest amount of fabrication at the Derby Works, and thus deliver the largest possible components to site.

Since access to Trawsfynydd is restricted, completed boiler strakes 18ft wide and with a maximum height of 9ft 6in are transported by road from Derby to Liverpool. Here they are loaded on to small coastal ships and taken to Portmadoc where they are transferred to road vehicles for the final section of the journey to site.

The site fabrication shop is situated at the northernmost end of the Goliath crane tracks, and is a "T" shaped building 400ft long and 160ft wide. Within the buildings are areas for boiler and ducting fabrication and element cleaning, as well as for the normal services of storage, maintenance, laboratory work, etc.

On arrival from the Derby Works boiler strakes are welded into sub-assemblies, radiographed and then passed through the manipulation section where the sub-assemblies are welded into complete boiler shells. The boiler shells are completed on one of the two main assembly lines and afterwards are removed on to the workshop apron beneath the Goliath crane, before lifting into the stress-relieving furnace.

The CO₂ ducting sections, of which there will be a total length of 4,000ft, arrive from Derby in sizes to suit transportation and manufacture. These components are welded in the ducting fabrication area into suitable sizes for lifting into the reactor area. After delivery from the

Stress-relieving furnace for the boiler shells. The boiler shell is shown in the furnace before its roof has been replaced for stress relieving



Derby Works, the boiler elements, which involve 500,000 sq ft of heating surface, are off-loaded and stored in the boiler element area before pickling. In the site fabrication shop the tube element exteriors are cleaned to the required standards and then inserted in a canister for transport to the reactor building area. A hydrochloric acid pickling tank, a citric acid washing tank and water rinsing tanks are provided for this purpose. After the elements have passed through these tanks, they are dried by hot filtered air and slid into canisters which have previously been internally cleaned by a similar process.

A stress-relieving furnace with a removable roof, hydraulic test plinths and cleaning and lifting plinths adjoin the site fabrication shop. These are served by the Goliath crane, which also transports the completed boiler shells to the reactor areas.

When stress relieving has been completed, the boiler shell is lifted from the furnace by the Goliath crane and lowered on to the adjacent hydraulic test plinths. Metal caps, used to cover the thermal sleeves during stress relieving, are removed and replaced by screwed steel covers to withstand the hydraulic test pressure of 460 p.s.i. Domes are welded on to the inlet and outlet sleeves and manhole doors are securely fastened. Some 800 tons of water are then poured into the vessel in several stages. At each stage, water is circulated through electric heaters of 520 kW capacity to maintain a reasonable shell temperature at all times during the filling operation.

After the vessel has been filled and air extracted, pressure is raised by means of a three-throw ram pump up to

460 p.s.i. On completion of the test, pressure is dropped and the vessel emptied. The seals are cut away from the sleeves of the vessel, which is then prepared for internal shot blasting.

Following hydraulic testing, the boiler shell is lifted by the Goliath crane and placed on the cleaning and lifting plinths. The end domes and internal bracings are removed, and the inside of the vessel is shot blasted from end to end. Seals are provided to prevent contamination of the clean areas during this operation. Permanent supporting steelwork for the tube element banks is installed, and the interior of the vessel is painted to preserve cleanliness.

For lifting the boiler shell to its final position, a tail-car structure is provided which converts the vessel from a horizontal to a vertical position on the initial lift (using a lifting girdle). This tail-car, which is designed for a maximum load of 70 tons, can traverse a track as the vessel changes its inclination. Before the component reaches its vertical position, all load is taken on the lifting girdle. The vessel is finally transferred to its permanent position by the Goliath crane. A clean conditions hut is then built on top of the boiler and the tube elements are installed.

When this operation has been completed the ends of the boilers are sealed and the clean conditions hut removed. To eliminate ingress of foreign particles before installation of the gas circuit, nitrogen is injected into the boiler, thus ensuring that the pressure is slightly above atmospheric. On completion of the gas circuit and final boiler welds, the full gas circuit, including the reactor and boiler vessels, is subjected to a pneumatic pressure test.



400-ton Goliath crane lifting the completed boiler shell. After fabrication in the site shop, the boiler shell is slid out of the side of the shop on bogies and then lifted in the position illustrated. The vessel is moved to the stress relieving furnace adjacent to the Goliath support leg. After stress relieving, the vessel is again lifted to the hydraulic test plinths which are situated beside the furnace

Telecommunication Component Standards

TWO more British Standards in the series for components intended primarily for use in telecommunication and allied electronic equipment have been published. They are B.S. 2133B: Part 1, which specifies general requirements and tests for fixed ceramic dielectric capacitors, Grade II, and B.S. 2136: Part 1, which lays down general requirements and tests for fixed metallised-paper dielectric capacitors for d.c. operation. They provide a means of judging the capacitors' suitability for use over stated ranges of temperature and humidity, their ability to withstand mechanical shock of the kind to be expected in transit or in operation, and their ability to remain unharmed by normal assembly processes, such as soldering. Exacting climatic and durability requirements are laid down, with tests. Most of the tests are described in detail in B.S. 2011, "Basic climatic and durability tests for components for telecommunication and allied electronic equipment," and reference to that standard is therefore necessary.

The first standard applies to capacitors with a rated voltage of not more than 1,500 V, while B.S. 2136 covers fixed metallic-paper dielectric capacitors suitable for d.c. operation with or without a small superimposed a.c. component. These capacitors have a dielectric of impregnated paper with thin metal electrodes deposited on it and possess self-healing properties.

Copies may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, or from the Manchester Office, Coronation House, Market Street, Manchester, 1, price 12s 6d each.

E.R.A. CREEP LABORATORY

THE new Creep of Steel Laboratory of the Electrical Research Association at Cleeve Road, Leatherhead, was formally opened yesterday by Dr. Charles Sykes, C.B.E., F.R.S., F.Inst.P., managing director of Thos. Firth & John Brown, Ltd. The laboratory is concerned with the creep and rupture properties of high-temperature steels used in modern thermal power stations, and the work will be devoted principally to long-term tests.

The overall efficiency of a thermal power station depends on the difference between the average temperature of the heat intake and the turbine outlet temperature. Since the lowest outlet temperature has been obtained by the use of high-vacuum condensers, efficiency can only be improved by raising the top temperature. This demands that the steels used in boilers, pipework and turbines should withstand these higher temperatures.

Steels to meet these more arduous conditions are in continual development, but due to their high cost they must be used in the thinnest possible sections. It is therefore important to obtain an accurate knowledge of the stresses that could be withstood over long periods of time. The creep and rupture properties have to be measured so that the power station can be designed with the smallest safety factor during the life of the station, about 20 years.

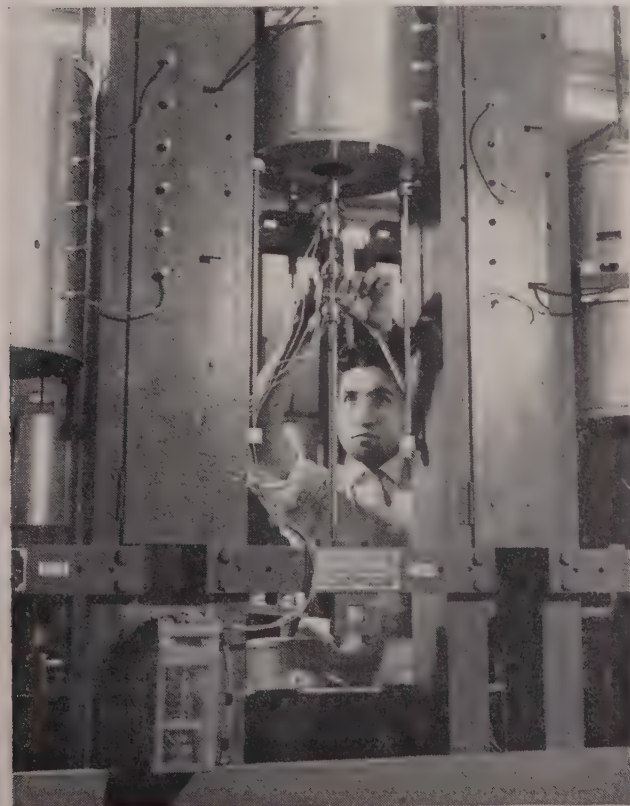
The new E.R.A. laboratory was completed at the end



Part of a bank of 25 creep machines. The specimens contained in the furnaces in each of these machines are fitted with dial gauge extensometers. Temperatures of 450–750°C are obtainable in the furnaces; specimen temperatures are measured by thermocouples and the values are indicated at a central control desk. The operator is shown adjusting an electronic furnace temperature control

of last year and has a total area of 9,900 sq ft. It is equipped with 50 high-sensitivity creep machines, which are in general use to measure the creep properties on rotor forgings, whilst another 25 machines are equipped with dial gauge extensometers for measuring the creep properties of the thick castings used for turbine cases.

The rupture properties of high-temperature steels used for the manufacture of pipes and superheater tubes are measured in 75 multi-rupture testing machines. In these machines either ten specimens or three specimens, depending upon the size of the furnace, are stressed in series at



(Left) Close-up of one of the 25 small multi-rupture testing machines. The operator is attaching thermocouples to the centre portions of the three test specimens after which the furnace will be dropped into position

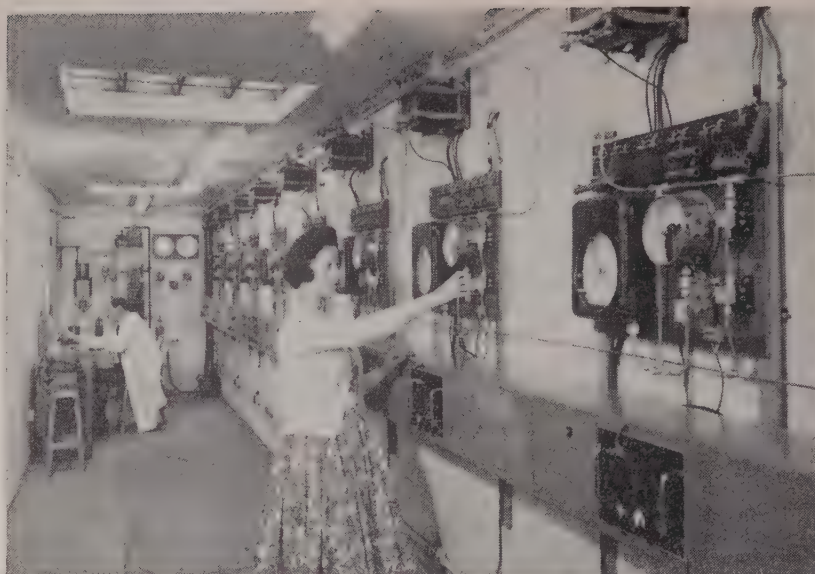
(Below) A power saw used for cutting steam pipes. The pipe shown has an outside diameter of 12in and a radial thickness of 3in and is made from highly alloyed austenitic steel. About 4 hours is required to cut through an average pipe



the same temperature and stress, and the time to fracture of each specimen is measured.

Temperature control of the specimens for creep and rupture testing is achieved by electronic temperature controllers actuated by platinum resistance thermometers inserted in the furnaces. The temperature of each furnace is measured by either three or five thermocouples tied to the specimens and measured at a central control desk. From the measurements of time to reach a specific amount of creep or to rupture with variable stress or temperature, graphs are plotted which allow estimates to be made of the expected life of components used in the power station.

Another major item of research in this laboratory is the correlation of the high-temperature stress rupture properties obtained by uniaxial tensile tests with those obtained by subjecting thick-walled tubes in 11 special rigs to internal steam pressure. The results are then compared with predicted values obtained from three simple design formulae. One 15 ton creep machine is



The control corridor for the eleven thick tube bursting rigs

included for testing steam pipe specimens of full wall thickness. The creep machines were manufactured by Nash & Thompson, Ltd., while the reactor type control units were made by C.N.S. Instruments, Ltd.

Boiler Feed Pump Motors

CONSTANT speed squirrel-cage motors running at 3,000 r.p.m. have for long been the standard drive for centrifugal boiler feed pumps, but motor sizes have increased considerably with the higher pressures in larger modern boiler plants. Variable speed drives are now required for these larger units and the slip-ring motor is generally used as it has the advantages of low cost, simple control and low starting current.

Slip-ring motors have been manufactured in large sizes, 20,000 h.p. or more, but of fairly low speed. The design of a 3,000 r.p.m. wound rotor machine of 2,000 h.p. or more raises the important problem of cooling the rotor end windings and at the same time providing adequate support.

To meet the demand for high-speed large-size motors for driving boiler feed pumps in power stations the English Electric Co., Ltd., have designed and manufactured machines using hollow conductor rotors. Air enters

at each end of the conductors, keeping the end windings cool. Direct cooling also reduces the cooling air quantity to the minimum so that the motor efficiency is improved.

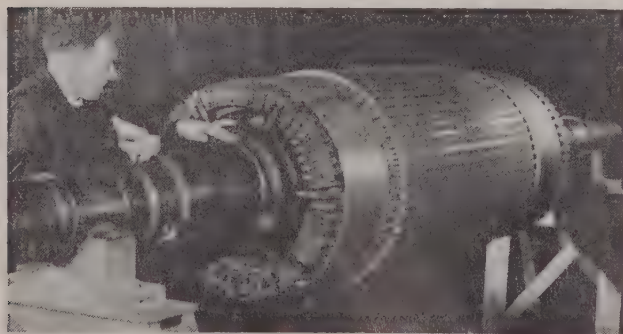
Eight machines using rotors of this type are being commissioned for driving the main boiler feed pumps at two C.E.G.B. power stations. Four of the motors, for Willington "B," are each rated at 6,200 h.p. and four, for Belvedere, at 2,560 h.p. Although these large high-speed slip-ring motors have been developed for driving boiler feed pumps they can also be used for other high-speed industrial drives needing speed variation and/or a low starting current.

Crimped Joints for Aircraft Cables

A BRITISH Standard has now been published which provides details of the requirements of aircraft constructors and operators for crimping non-insulated connections for general purpose electrical cables for aircraft. The Standard (G.178) deals with the completed joints and, in part, with tools and terminal ends which will be the subject of more detailed standards in due course.

Since satisfactory crimping depends upon the maintenance and setting of tools, the standard contains recommendations for tests to confirm their serviceability. The design requirements are related to terminal ends and in-line connectors and also to completed crimped joints. Envelope dimensions for the completed joints are specified to ensure interchangeability of various types of crimped termination in terminal blocks and other equipment. Standards for terminal ends and connectors are in course of preparation.

Copies of this British Standard, G.178—Crimped joints (non-insulated) for general purpose electrical cables for aircraft, are obtainable from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 6s.



The rotor of an English Electric direct air-cooled, hollow conductor, 2,560 h.p., 3,000 r.p.m. slip-ring induction motor for Belvedere power station

LIGHT CONTROL

By P. G. GOULDING, Dip.M.I.E.S.*

The emphasis on the elimination of glare and the increased illumination levels recommended in the new I.E.S. Code are discussed. Various types of glare are described and means for removing the causes are suggested

THE Illuminating Engineering Society have just issued a completely revised edition of the I.E.S. Code giving recommended values of illumination for building interiors covering industrial and commercial premises, see *Electrical Review* of 14th April, 1961, pp. 645 and 671. Compared with the last revised edition of this Code in 1955, the recommended lighting intensities in lumens/sq ft on the "working plane" have been increased by as much as 100 per cent in some cases.

Clearly, it is of paramount importance that in the preparation of lighting specifications very careful consideration must now be given to the question of glare. Greater thought will have to be given to the selection of light sources and lighting fittings and also to the positioning of the fittings in relation to the operatives and the normal field of view.

Glare may be said to be any brightness that causes discomfort, interference with vision, or eye fatigue. It may be direct glare from a light source, indirect glare due to reflection from a specular surface, or "contrast glare" from a high brightness source against a dark background.

Source brightness or intrinsic brilliancy is normally expressed in candles/sq in and may be defined as the luminous intensity of projected area in a given direction. A surface which diffusely emits or reflects one lumen/sq ft has a photometric luminance of one foot-lambert. For general comparison purposes, it may be stated that a clear blue sky has a brightness of between 2 and 3 candles/sq in, compared with approximately 5,500 candles/sq in for a 300 W gas-filled tungsten lamp.

Types of Glare

Glare may be divided into two categories as follows:—

(1) *Disability Glare*.—This is nearly always associated with excessive light entering the eye and may be due to (a) the angular nearness of the glare source to the normal line of sight, (b) the brightness of the glare source, and (c) its projected area in the direction of the viewer.

(2) *Discomfort Glare*.—In the majority of cases, this is found to be due to excessive contrast in brightness between the light source or its reflected image, and the surrounding background.

Excessive brightness ratios or contrasts in the field of view between adjacent surfaces may militate against a completely satisfactory lighting installation. To achieve acceptable brightness ratios in any given situation requires a careful study of all factors involved, not only the light sources and fittings but also the reflecting characteristics

of ceilings, walls, floor and furnishings. Ideally, a correct balance should be achieved between the brightness of the immediate working area and that of other surfaces in the visual field.

Task and Background Brightness

The brightness pattern has to be related to the average brightness of three main areas in the field of view, i.e. that of the task itself; the immediate background; and that of the general surroundings. For some years it has been accepted that the brightness of the surrounding background should not be less than 10 per cent of that provided at the point of work. In addition, it is now recommended that where a high task brightness is prescribed, the immediate background brightness should be 30 per cent of the specified value for the occupation under consideration.

The installation of a large area of brightness such as a luminous panel, or a number of low-brightness lighting fittings may, in certain conditions, be as uncomfortable as a single small source of higher brightness. A fitting with a high intrinsic brightness may be quite acceptable and comfortable in a small office where the unit or units are out of the normal range of vision, but would be quite unsatisfactory in larger rooms where the light sources further away approach the normal line of sight. Similarly, fittings which individually do not have a high brightness may, if mounted in large groups, present a total area sufficient to produce discomfort to the eye.

To reduce glare in industry, factory regulations issued in 1941 stipulated that "where the light source is less than 16ft above floor level, no part of the source or of the lighting fitting having a brightness greater than 10 candles/sq in shall be visible to persons whilst normally employed within 10ft of the source, except where the angle of elevation from the eye to the source exceeds 20°." It was also stated that the lighting units should be so placed as to prevent discomfort by the reflection of light from smooth or polished surfaces into the eyes of the worker (specular reflection).

In the new I.E.S. Code, glare discomfort is expressed in terms of a Glare Index, based on the factors already discussed earlier in this article. The Building Research Station have produced a basic glare formula for a regular and symmetrical lighting layout. The Glare Index for any installation may be derived from the basic formula, and can be calculated from the data given in tables

* Holophane, Ltd.

published in the Code for lighting distributions corresponding to British Zonal Classifications described in I.E.S. Technical Report No. 2. Thus, in addition to recommended values of illumination in lumens/sq ft for each occupation, a limiting Glare Index is also given in the new I.E.S. Code.

To achieve economically the new higher levels of illumination from relatively low mounting heights, particularly in offices, schools, public buildings, banks, stores and laboratories, tubular fluorescent discharge lamps (MCF/U) will probably be installed. In the case of a large recessed flush lighting unit, glare may be experienced from the contrast between the brightness of the light source and the relatively dark ceiling surround when viewed from angles near the horizontal. It has been found that the 70° cut-off of a standard industrial fluorescent trough fitting gives excessive brightness contrast and insufficient screening for many installations. To reduce the luminance emitted at angles above 60°, it has become general practice to incorporate slats or square "egg crate" type louvre attachments, which also serve to screen the lamp from direct view. This procedure has become even more necessary where bare lamp batten-type fluorescent fittings have been installed.

Open type louvres have not, however, proved to be

completely satisfactory and this has led to the development of special prismatic lens plates which operate as optical louvres. There is a particular design of conical prism that restricts the projection of the emitted light to a cone, thus limiting or preventing the emission of light within the "glare zone" angles near the horizontal. The luminance or photometric brightness of a fitting incorporating such a prismatic plate is therefore greatly reduced when it is viewed from angles within 40° from the horizontal.

There is also a concentration of light in a downward direction, beneath the plate, giving over one and a half times the relative intensity of a perfectly diffusing medium, such as opal glass having the same transmission factor. The plates are uniformly flashed at all angles of view and have a high utilisation of light factor when used in conjunction with tubular fluorescent discharge lamps. The cut-off conical prism method of control is of particular value in installations having continuous rows of fittings, such as in a drawing office, where serious glare can occur if the luminance distribution is not properly controlled.

The development of specially designed prismatic lens plates will be an important factor in the elimination of glare particularly in offices when the higher levels of illumination in the new I.E.S. Code are adopted.

Load Growth in Nigeria

IN its ninth annual report, covering the year ended 31st March, 1960, the Electricity Corporation of Nigeria records further progress in load development. The chairman, Professor Eni Njoku, says that the country is "bursting with vitality" and light and heavy industries of a varied nature are being established at the major load centres. Many of these industrial projects matured during the year under review and the development of commercial and residential load was accordingly high.

The policy of encouraging and assisting in the industrial and commercial development of the country by the application of special terms to large consumers with favourable load characteristics continued throughout the year. Collection of statistical data to facilitate tariff investigations proceeded and a report is now to be prepared which will contain recommendations for a revision.

Progress was made with the Corporation's new towns development programme and the installation of pilot village schemes continued. The two village schemes of Bichi in the Northern Region and Omoba in the Eastern Region were completed and the new undertaking of Owerri was commissioned in March, 1960, while Umuahia was nearing completion.

The number of kWh generated rose by 19.3 per cent to 361 million and sales to consumers advanced by 18 per cent to 287 million kWh. The number of consumers increased from 84,087 to 94,653. New plant amounting to 35.3 MW was installed during the year, making the total capacity now in commission 135.7 MW; a further 44.8 MW was under construction. The aggregate maximum demand of all undertakings increased from 65.7 to 75.5 MW (14.9 per cent). In the nine years since vesting day both the installed generating capacity and aggregate maximum demand have increased about sevenfold.

Generation and distribution at the various undertakings were satisfactory on the whole, including the experimental rural supply schemes, but acts of sabotage perpetrated in

some stations during a seven-day strike by junior service personnel affected continuity of supply.

Revenue increased by 21.4 per cent to £4.7 million and there was a net surplus of £442,095 compared with £427,177 in the previous year when no interest was paid on account of the moratorium on the earlier Federal Government loans.

The average price received was 3.853d per kWh. Capital expenditure amounted to £3,693,709, of which £1,132,305 (31 per cent) was available from revenue. It is pointed out that the increasing surplus is enabling the Corporation to finance more of its capital programme out of revenue, thus relieving the Federal Government of an appreciable part of the burden on its resources.

Telecontrol Specification

THE Joint Radio Committee of the Nationalised Fuel and Power Industries has prepared a basic specification for electronic telecontrol equipment for the remote indication and control of plant from unattended points over both wire and radio links. It is hoped that this will help to rationalise the production of suitable equipment and avoid the necessity to design equipment on an individual basis for special applications.

With the equipment specified, a number of outstations can indicate to a central station the state of their plant by means of two-stage and analogue measurements which are digitised for transmission; control of the plant from the central station is catered for but may be omitted if desired. Automatic alarm features are included and the central station equipment is arranged to give print-out for data logging if required.

Copies of the specification can be obtained from Mr. G. D. Turton, Secretary, Joint Radio Committee of the Nationalised Fuel and Power Industries c/o Central Electricity Generating Board, Bankside House, Sumner Street, London, S.E.1.

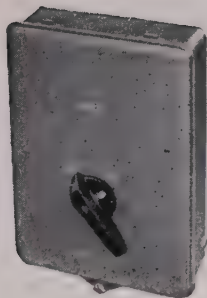
'HIDUTAC' switchfuses break 8 times their rated full load current

This high breaking capacity is made possible by cam-operated, silver contact, double-break "interruptor" units—just one of many 'Hidutac' exclusive features resulting from the *new approach* of the G.E.C. Installation Equipment Group to switchgear design. The *new approach* has crystallised from G.E.C.'s many years' experience of making switchgear superbly well.

Consider these other impressive advantages: *Unlimited full load switching*—'Hidutac' switchfuses operate at their full load current with unfailing reliability. *A unique compactness*, brought about by radial positioning of contacts. Generous wiring space and easy access to terminals at the front. *Total internal enclosure* of all moving parts, with shields over live terminals. *High fault current protection* in Single Pole and Neutral, Double Pole, Triple Pole and Neutral switchfuses with H.R.C. or rewirable fuses. Categories of duty are: H.R.C. fuses, all ratings, AC4 of BS88 (33000 amp); rewirable fuses, 15 and 30 amp ratings, S2A of BS3036 (2000 amp); rewirable fuses, 60 amp rating, S4A of BS3036 (4000 amp). *Modern styling* of pressed steel case with fully interlocked cover.

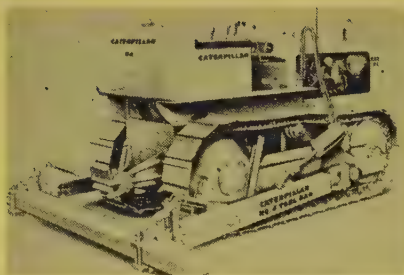
These exclusive features make 'Hidutac' switchfuses vastly superior for tungsten and discharge lighting control, motor control, and transformer and capacitor switching.

IMMEDIATE DELIVERY of 'Hidutac' switchfuses from wholesalers throughout the country. For more detailed information ask your wholesaler for 'Hidutac' literature.

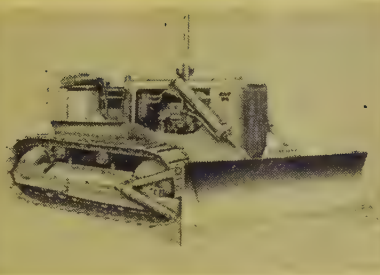


that's the **New Approach** of **G.E.C.**

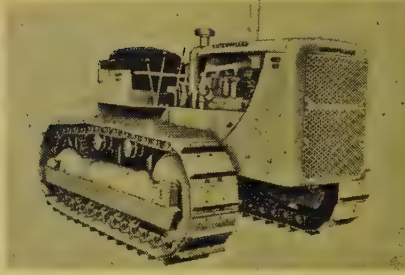
INSTALLATION EQUIPMENT GROUP



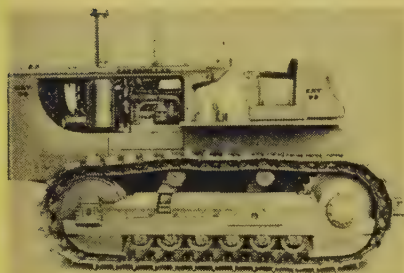
D4C Tractor, 65 H.P., British Built



D6B Tractor, 93 H.P.

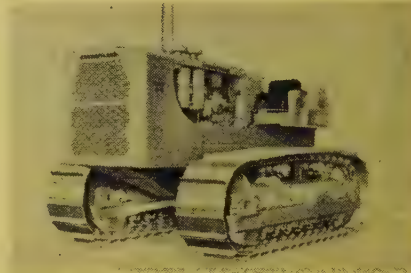


D7D Tractor, 140 H.P.

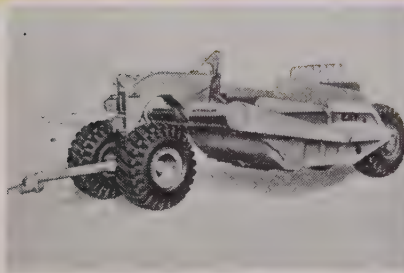


D8H Tractor, 235 H.P. Power Shift, Direct, or Torque Converter Drive, British Built

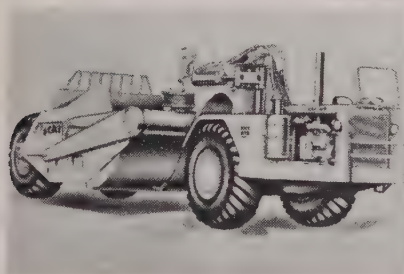
**AVAILABLE
EX-STOCK
FROM**



D9E Tractor, 335 H.P. Power Shift, Direct, or Torque Converter Drive



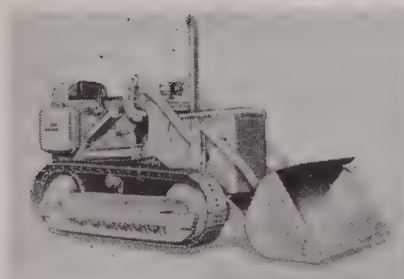
463F Scraper, 28 cu. yd. heaped capacity, British Built



619B Tractor/442 Scraper, 225 H.P. 18 cu. yd. heaped capacity



631A Tractor Scraper, 420 H.P. 28 cu. yd. heaped capacity



Range of Track Type Traxcavators 933F, 955F, 955H (illustrated), 977H



Range of Wheel loaders 922A, 944A (illustrated), 966A Traxcavators

**Caterpillar
design and
manufacture the
world's largest
range of
earthmoving
equipment
Bowmaker
stock them all.**

Bowmaker also
offer today's best value
in a wide range of
used equipment.

New or used—
all with the reliable
Bowmaker Parts and
Service backing.

BOWMAKER (PLANT) LIMITED
AUTHORISED CATERPILLAR DEALER

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

WATLING STREET · CANNOCK · STAFFS
Tel: Cannock 2551

COLCHESTER AVENUE
COLCHESTER TRADING ESTATE · CARDIFF
Tel: Cardiff 35661

EXHIBITION WAY · EXETER · DEVON
Tel: Exeter 66313

HULSE ROAD · SALISBURY · WILTSHIRE
Tel: Salisbury 4965

CHESTERFIELD ROAD · CLAY CROSS
DERBYSHIRE
Tel: Clay Cross 2571

VIEWS on the NEWS

By "REFLECTOR"

THE dependence of the gas industry upon electricity is most marked in the case of the Lurgi complete gasification plant at Westfield, Fife, which was opened by the Queen last week. There are said to be over 220 electric motors of an aggregate capacity of 15,000 h.p. The two largest (1,800 h.p.) drive a pair of turbo air compressors, each of which has an output of half a million cubic feet an hour. There are also two 1,450 h.p. motors driving four-stage reciprocating air compressors. Commenting on the plant, the *Scotsman* says:—

"First, electrical power is used to make cheap gas, and more of it, for those who favour gas for domestic and industrial purposes. And, secondly, electricity consumers also reap some benefit, albeit indirectly, in that the high consumption of power by the Westfield plant means that local power stations can operate at a slightly higher load factor to improve overall efficiency in the production of electricity."

* * *

After the electricity supply of a Hyde (Cheshire) man had been cut off by the North Western Electricity Board an inspector discovered that the supply had been reconnected but the meter was not registering. When the matter went to Court it was stated that a pair of wires had been connected to the supply in a neighbour's house; the neighbour's meter had recorded the extra consumption and he had been paid for it. It would thus seem that the Board had no grievance, but the defendant, by this device, had avoided the first step of a block tariff and had obtained his electricity at 0.99d per kWh instead of 5½d for the first 44 kWh. He was fined £10.

* * *

An intriguing history of "Battery Traction in Trams and Railways" has been produced by T. Illingworth, A.M.I.E.E. (Oakwood Press, Lingfield, Surrey, 23 pp., 5s). From this it appears that the first battery-propelled vehicle was constructed by Robert Davidson, of Aberdeen, in 1837. It was a four-wheeled truck 16ft long and 6ft wide running on a wood-plank track of 6ft 6in gauge. What is surprising is that it was driven by two motors, each consisting of a 12in diameter wooden cylinder 30in long mounted directly on the axles, four 4in square iron bars being equally spread around the circumference to form an armature which revolved between the poles of two horizontal U-shaped magnets. This motor must have been among the earliest practical electrical machines. The first accumulator-driven tram

was put into service in Paris 80 years ago; the latest public transport vehicle of this kind appears to be the Aberdeen-Ballater railcar (British Railways) which has operated since 1958. In between these have been many ingenious and useful systems but as the author implies, battery traction is now feasible only for purposes other than passenger transport.

* * *

I notice from the accounts of E.P.E.A. branch meetings reported in the *Electrical Power Engineer* that these gatherings are largely held in licensed premises (although I notice in the June issue that one meeting was held at a Y.W.C.A. hostel). This pleasant custom sometimes leads to divided attention; the report of one branch says:—

"For the first half hour the meeting was in progress the forty-one members who eventually signed the record as attending the meeting were very nearly equally divided between the bar and the meeting."

* * *

One of the papers presented at the Brighton Convention of the Incorporated Municipal Electrical Association half a century ago was by Mr. J. W. Beauchamp, then chief electrical engineer at Tunbridge Wells but later the first director of the Electrical Development Association. Dealing with "Modern Wiring Practice," Mr. Beauchamp criticised the then-existing regulations as too stringent and unenforceable. As reported by the *Electrical Review* of 7th July, 1911, he said:—

"The proper course appears to lie in drafting simple and definite rules dealing with:—(1) Safety of the consumer; (2) non-interference with the proper working of the supply to other consumers. The requirements of these regulations to be made as light as possible, but the enforcement of them to become more stringent. A change in this direction should secure greater uniformity of work, tending to lower the cost of high class wiring and force up the quality of the lower class work, as in the latter almost all the trouble arises from insufficiently skilled labour; the employment of competent and full priced wiremen would frequently reduce the prime cost of jobs, and save good material from being reduced to a secondhand condition before it is even put to work."

Domestic Supplement — Electric Fires — at the end of this issue

PERSONAL AND SOCIAL

News of Men and Women of the Industry

Mr. Justin H. Scott, B.A., has been appointed to the board of Laurence, Scott & Electromotors, Ltd., thus renewing the active participation of the Scott family in the management of the firm founded by his grandfather in 1883. His father, the late Capt. J. S. Scott, was chairman and managing director at the time of his death in 1942. After gaining his degree at Cambridge, Mr. J. H. Scott joined the company about ten years ago at the Norwich works, where he has already held executive positions.



Mr. J. H. Scott

Sir Noel Hall, M.A., and **Mr. L. W. Cole, B.Com.**, have been elected directors of Babcock & Wilcox, Ltd. Sir Noel Hall was recently appointed principal of Brasenose College, Oxford, having been principal of the Administrative Staff College, Henley, since 1946. Mr. Cole, who has been in the service of the company for over 30 years, became secretary in 1952 and, in 1958, was made responsible for financial control within the group. He will retain the position of secretary until the end of the year.

After 51 years' service with W. T. Glover & Co., Ltd., **Mr. J. H. Maxwell** retired from the position of general manager on 30th June but continues as

a director. Mr. Maxwell joined the company as an office boy and after a period of duty with the Royal Naval Volunteer Reserve in the 1914-18 war, he returned to Glovers. In 1928 he became manager of the Estimating and Order Department. He was appointed sales manager in 1952, and general sales manager two years later. In 1955 Mr. Maxwell became deputy general manager with a seat on the board of the company. He was appointed general manager in 1959.

His successor is **Mr. E. P. G. Thornton, A.M.I.E.E.**, a director and previously deputy general manager. Mr. Thornton joined the outside contracting organisation in 1939. He was appointed assistant chief engineer, Paper Cables Division, in 1943, and technical manager (mains cables) later in that year, and in 1960 he was made a director and joint assistant general manager.



Mr. E. P. G. Thornton

Mr. W. R. Gibb, director and previously joint assistant general manager, has been appointed assistant general manager, and will deputise for Mr. Thornton. Mr. Gibb joined the company in 1944, was made a director and financial manager the following year, and was appointed joint assistant general manager in 1960.

Submarine Cables, Ltd. (owned jointly by A.E.I. and B.I.C.C.) announces the appointments of **Mr. G. H. Foot, B.Sc.(Eng.), A.C.G.I., A.M.I.E.E.**, as director and chief engineer (with effect from 21st June) and of **Mr. S. J. Wilson** as works director (from 1st August).

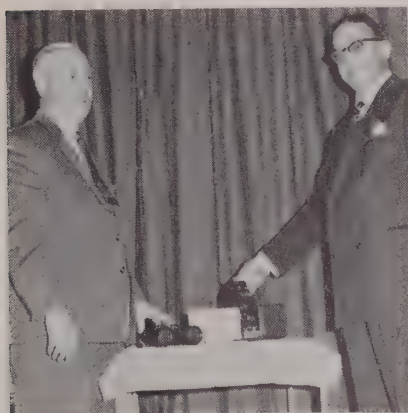
Mr. Foot joined Submarine Cables in 1958 and became manager of the Repeater Division in the following year. Previously he had been engaged on the study of future telecommunication systems with A.E.I., Woolwich. From 1936 to 1946 he worked on the development of carrier transmission systems in the telecommunications laboratories of Siemens Bros. & Co., Ltd., and later held appointments with the Companhia Telefonica Brasileira, Rio de Janeiro; Mullard, Ltd., in London; and the

Philips Telecommunications Division, Hilversum, Holland.

Mr. Wilson has been joint manufacturing manager of the A.E.I. Cable Division since January, 1960. He started his career with W. T. Henley's Telegraph Works Co., Ltd., at Gravesend in 1922, becoming superintending assistant in the Engineering Department in 1928 and in 1935 transferring to Henley's Tyre Co. as works superintendent. In 1936 he joined the cable works and was appointed assistant works manager in 1942. He became deputy works manager in 1951 and general works manager in 1952. He was associated with the development of the overseas cable factories of Fairfield Cables in Australia and of African Cables, Ltd., in South Africa, and also took part in the planning of the new factory for Henley Cables India, Ltd.

Mr. Ernest Heaps has recently retired at the age of 77 from the chairmanship of the Brighton Lighting & Electrical Engineering Co., Ltd., which he founded over 40 years ago. Mr. Heaps was born in Lancashire and became an electrical engineer with the Westinghouse Co. in Manchester where he designed electric controllers for the early Brighton trams. He joined Allen West & Co., Ltd., in 1910 as the company's first works manager. Before the days of the traffic lights Mr. Heaps designed the first electrically-operated traffic semaphore signals in the country for use in Brighton.

Mr. J. F. Prince, M.I.Ex., retired at the end of June after over 42 years' service with the General Electric Co., Ltd. He started with the company at Manchester after war service and specialised in the electrification of textile mills. In 1924 he was made manager of the Engineering Department at Liverpool and from 1930 until



Mr. J. H. Maxwell (left) being presented with a camera and pair of binoculars by Mr. R. M. Fairfield, assistant managing director of British Insulated Callender's Cables, Ltd.



Mr. J. F. Prince



Mr. K. D. Starr

his retirement he has been manager of the Export Sales Department at the Witton Works.

Mr. K. D. Starr, B.Sc., A.M.I.E.E., A.M.I.Mech.E., who succeeds Mr. Prince, served with the R.E.M.E. in India and the Far East from 1943 to 1947, rising to the rank of captain. He joined the G.E.C. in 1947 and, on completing his graduate apprenticeship course, was appointed liaison engineer in the company's Export Department in London. In 1950 he was transferred to the British General Electric Co. (Pty.), Ltd., Johannesburg, as a branch engineer and three years later he was appointed chief engineer and subsequently director of the British General Electric Co. of Central Africa (Pvt.), Ltd., at Salisbury, Southern Rhodesia.

Mr. George A. Smith has been appointed general manager of the Electronic and Equipment Group of the Plessey Co., Ltd. Mr. Smith spent the war years as a radar officer in the R.A.F.V.R. and for ten years afterwards he worked with Pye, Ltd., initially as a development engineer and later as the export manager of the Pye Telecommunications Division. In 1957 he joined Plessey International, Ltd., later becoming general manager of the Plessey Telecommunications Division and, last year, commercial executive of the Electronic and Equipment Group.



Mr. G. A. Smith

Mr. T. Carlile, B.Sc.(Eng.), A.C.G.I., has been appointed general manager of the Renfrew, Dalmuir and Dumbarton works of Babcock & Wilcox, Ltd., on the retirement of **Mr. D. D. Cruickshank, C.B.E.,** from that position. Mr. Carlile joined Babcock & Wilcox in 1944 and was appointed to

the Project Department. In 1948 he was transferred to the New York office and two years later he became the company's New York representative. He returned to Great Britain in 1954 to take up the appointment of assistant general manager of the Renfrew and Dumbarton Works and in 1959 he was appointed deputy general manager of the Renfrew, Dalmuir and Dumbarton works.

The Minister of Power has appointed **Mr. J. B. Upton, M.B.E., T.D., D.L., J.P.,** of Hotham, Yorkshire, as a part-time member of the Yorkshire Electricity Board.

Mr. B. S. Taylor, managing director of Reesoids, Ltd., has retired after 40 years' service. He is, however, remaining on the board. **Mr. S. R. Jarvie** has been appointed a director of the company and **Mr. C. M. Lloyd, F.C.I.S.,** has been appointed secretary. **Mr. F. J. Larard, M.I.E.E., M.I.E.(Aust.), M.Amer.I.E.E.,** formerly of the Crown Agents for Overseas Territories and H.M. Colonial Service, has been appointed general manager.

The Electric Lamp Industry Council announces that **Mr. J. Clement,** of the A.E.I. Lamp & Lighting Co., Ltd., has been elected chairman for the ensuing year. Mr. J. Clement is a vice-chairman of the British Lighting Council.

Mr. John Appleby, A.M.I.E.E., M.I.Mech.E., M.Amer.I.E.E., consulting engineer to the Compania Anonima Luz Electrica de Venezuela, is due to arrive in London during next week for a month's stay in this country before proceeding to the Continent. Communications can be sent to him at the Canning Club, Hamilton Place, Piccadilly, London, W.1.

Mr. C. F. Kearton, O.B.E., F.R.S., deputy chairman of Pinchin, Johnson & Associates, Ltd., has resigned from the board at his own request and the following appointments have been made:—**Mr. W. T. Branscombe,** deputy chairman; **Mr. W. Gerard Daroux,** managing director; **Mr. G. F. Ingham Clark,** commercial director; and **Mr. W. S. Kerr,** sales director.

Mr. A. B. M. Simpson and **Mr. N. H. Leach** have been appointed directors of Marco Refrigerators, Ltd.

After 48 years' service with the General Electric Co., Ltd., **Mr. A. B. Price, A.M.I.Mech.E.,** sales manager of the company's engineering works at Erith, retired at the end of June. From 1923-49 Mr. Price was South Wales district manager. He became head of the turbine department in the



Dr. K. J. Wootton, general manager, Erith Engineering Works of the G.E.C., presenting a cheque to Mr. A. B. Price

latter year and was appointed sales manager in 1951. He is the author of "Winding Engine Calculations" and "Koepe Winders" and following a visit to Germany on behalf of the Ministry of Fuel and Power he played a leading part in the introduction of the Koepe system into British coal-fields.

Mr. Eric Moran has been appointed senior representative of the Installation Equipment Group of the General Electric Co., Ltd., based at Leeds. He was previously commercial engineer for Atlas Lighting, Ltd.

Mr. Michael Collins, of Advance Components, Ltd., has been appointed material controller and assistant to the general manager. Mr. Collins, who was formerly the company's export manager, has been with Advance Components since 1946. He served in the Royal Navy during the war and before that with Marconi's Wireless Telegraph Co., Ltd.



Mr. M. Collins

Lt-General Sir William Stratton, K.C.B., C.V.O., C.B.E., D.S.O., has been appointed chairman of Edwin Danks & Co. (Oldbury), Ltd., and of Penman & Co., Ltd., in succession to the late General Sir Kenneth Crawford. Both these companies are members of the Babcock & Wilcox Group.

Mr. A. D. Thomson, B.Sc., has been appointed deputy managing director of Edwin Danks & Co. (Oldbury), Ltd. From 1954 to 1956 Mr. Thomson was assistant to the manager of the Calorizing Corporation of Great Britain, Ltd., a subsidiary of Babcock & Wilcox, Ltd., and was later transferred to the Special Vessels Department of the parent company, working



Mr. B. C. Pyle (left) and Mr. D. A. Pask. As reported in last week's issue, Mr. Pyle has been appointed assistant chief project engineer, Southern Project Group, C.E.G.B., and is succeeded by Mr. Pask as assistant chief project engineer, Northern Group

in close liaison with Edwin Danks & Co. (Oldbury), Ltd. Since 1958 he has been head of the Atomic Energy Commercial Section of Babcock & Wilcox, Ltd., being responsible for tendering on nuclear work, and for the financial control of nuclear contracts.

Mr. J. B. R. Jenkins has been appointed a senior sales representative of Switchgear & Instrumentation, Ltd.



Mr. J. B. R. Jenkins

The South Eastern Region of the Central Electricity Generating Board announces the appointment of **Mr. E. H. Boyce**, A.M.I.E.E., A.M.I.Mech.E., A.M.B.I.M., A.M.Inst.F., as station superintendent of Richborough power station. Mr. Boyce is deputy superintendent of Northfleet power station.

Mr. M. T. Marwood, D.S.C., has been appointed sales manager, Marine Department, Associated Electrical Industries Telecommunications Division. He succeeds **Mr. W. E. Warren**, who is remaining with the department in a consultative capacity until the end of November. Mr. Marwood served

in the Royal Navy for 22 years, being promoted to lieutenant-commander in 1948. He joined the A.E.I. Telecommunications Division in 1958 as a member of the Public Telephone Exchange Systems Department and in 1960 was transferred to the Marine Department as assistant to the sales manager.

Mr. H. Cooper, who has been appointed sales manager, Telecommunication Transmission Department, Associated Electrical Industries Telecommunications Division, started as an apprentice with the Post Office Engineering Department in Edinburgh in 1936, later becoming a probationary inspector in the Engineer-in-Chief's Department. During the war he served in the Royal Signals and was demobilised in 1947 with the rank of major. Returning to the P.O. Engineer-in-Chief's Department, he worked on the planning and development of long-distance coaxial transmission systems. Mr. Cooper joined the Automatic Telephone & Electric Co., Ltd., in 1951 as a sales engineer and subsequently became regional sales manager.

OBITUARY

Mr. B. Welbourn.—The death occurred at Caterham on Saturday at the age of 85 of Mr. Burkewood Welbourn, A.K.C., M.Eng.(Hons.),

M.I.E.E., a former vice-president of the Institution of Electrical Engineers. Mr. Welbourn joined the British Insulated Wire Co., Prescott (forerunner of the B.I.C.C.), in 1900 as contracts manager and was responsible for installations on behalf of the company in many parts of the world. He was appointed chief engineer of B.I. in 1927. In addition to his vice-presidency of the I.E.E. (1929-32) he had earlier served on the Council and helped in founding the Mersey and North Wales Centre of which he became the first chairman. He had also served as chairman on the Manchester Local Section in 1915-16. He read a number of papers before the Institution and was awarded the Paris Premium. Mr. Welbourn would have celebrated his diamond wedding anniversary in four weeks' time.

WILLS

Sir Alexander Roger, K.C.I.E., honorary president of British Insulated Callender's Cables, Ltd., and the Automatic Telephone & Electric Co., Ltd., who died on 4th April, left £221,644 gross (£211,028 net value).

Mr. R. A. Corbett, chairman and managing director of Newey & Eyre, Ltd., who died on 20th January, left £92,154 gross (£77,530 net value).

Sir Roger Duncalfe, former chairman of the British Standards Institution, who died on 15th April, left £130,485 gross (£128,172 net value).

Mr. H. D. Symons, chairman of H. D. Symons & Co., Ltd., who died on 15th January, left £6,641 gross (£5,251 net value).

C.E.G.B. Regional Appointments

FOLLOWING the regional reorganisation of the Central Electricity Generating Board, the following appointments of deputy and assistant regional directors have been made, with effect from 1st July:—

South Eastern Region

Mr. L. W. Stretton, M.I.E.E., formerly acting assistant regional director, North Thames Division, becomes deputy regional director.

Mr. F. W. Skelcher, M.I.E.E., M.I.Mech.E., formerly divisional controller, Midlands Division, becomes assistant regional director (North Thames Division).

Mr. W. H. Dunkley, B.Sc., M.I.E.E., M.I.Mech.E., formerly acting assistant regional director, South Thames Division, becomes assistant regional director (South Thames Division).

South Western Region

Mr. R. H. Coates, B.Sc.(Eng.), M.Inst.C.E., M.I.E.E., M.I.Mech.E., F.B.I.M., formerly divisional controller, Southern Division, becomes deputy regional director.

Mr. E. McCabe, M.I.E.E., M.I.Mech.E., M.Inst.F., formerly chief generation engineer, Southern Division, becomes assistant regional director (Southern Division).

Mr. H. S. Davidson, T.D., M.I.E.E., formerly divisional controller, South Western Division, becomes assistant regional director (Western Division).

Mr. W. Wilde, B.Sc.(Eng.), M.I.E.E., M.I.Mech.E., M.Inst.F., formerly divisional controller, South Wales Division, becomes assistant regional director (South Wales Division).

Midlands Region

Mr. J. B. Jackson, M.I.E.E., M.I.Mech.E., formerly divisional controller, North Eastern Division, becomes deputy regional director.

Mr. W. F. Cusworth, B.Sc.(Eng.), A.M.I.E.E., generation engineer, Eastern Division, becomes assistant regional director (W. Midlands Division).

Mr. O. S. Woods, M.I.E.E., M.I.Mech.E., M.Inst.F., formerly divisional controller, East Midlands Division, becomes assistant regional director (East Midlands Division).

North Eastern Region

Mr. C. G. Richards, M.Sc.Tech., A.M.I.Mech.E., A.M.I.E.E., formerly divisional controller, Yorkshire Division, has been appointed deputy regional director.

Mr. E. Forth, B.Sc., M.I.Mech.E., formerly chief generation engineer, North Eastern Division, becomes assistant regional director (Northern Division).

Mr. G. B. Jackson, D.F.H., M.I.E.E., overhead line engineer, Transmission Department, Headquarters, becomes assistant regional director (Yorkshire Division).

North Western Region

Mr. J. L. Ashworth, A.M.I.E.E., A.M.I.Mech.E., A.R.T.C.(S.), formerly deputy regional director, North West, Merseyside and North Wales Region, becomes deputy regional director.

Mr. D. F. Grant, A.M.I.E.E., formerly chief generation engineer, North West, Merseyside and North Wales Region, becomes assistant regional director.

Judgment in E.T.U. "Ballot-Rigging" Action

MR. J. T. BYRNE DECLARED GENERAL SECRETARY

IN a deferred judgment lasting four hours fifty minutes in the High Court last week Mr. Justice Winn found that five of the defendants in the Electrical Trades Union "ballot-rigging" case had acted in breach of the Union rules and had conspired together to prevent the election of Mr. John Thomas Byrne as general secretary in December, 1959. The five were Mr. Frank Foulkes (general president), Mr. Frank L. Haxell (general secretary), Mr. R. G. MacLennan (acting assistant general secretary), Mr. J. Humphrey (office manager) and Mr. John N. Frazer (member of the Executive Council).

The Judge also found that Mr. Byrne had suffered, as a result, a monetary loss of £380, less tax, to date, and a continuing loss of £346 a year, less tax "until such time as he may begin to receive the salary of general secretary of the Union."

The plaintiffs, Mr. Byrne and Mr. Frank Chapple, sought a declaration that the election of Mr. Haxell as general secretary in December, 1959, was *ultra vires* and damages for conspiracy. Defendants admitted that Mr. Haxell's election was not valid but denied all allegations of conspiracy and fraudulent practices. During the hearing defendants abandoned all allegations of fraudulent practices against Mr. J. W. Rengert and Mr. Charles Shipman, who acted as national scrutineers. The hearing lasted 38 days and costs are estimated at £80,000.

Mr. Justice Winn said the action had been brought by two E.T.U. members, not as representatives of the other members, but as personal plaintiffs. The defendants might be said accurately to represent the present leadership of the Union. Neither plaintiff had sought to denigrate the value of the defendants' services to the Union in securing material benefits for members.

Public Battle

The action represented the culmination of a public battle, which since 1956 or 1957 had rent and troubled the Union. "It is not out of place for the Court to entertain the hope that some good may emerge to the general body of members of the E.T.U. from the considerable expenditure of money and judicial time and attention," said the Judge.

After giving details of the Union

rules governing elections, Mr. Justice Winn said it was not a happy state of affairs. He advocated scrapping the present system and replacing it by a postal ballot.

Communist Influence

One of the issues in the case was whether any relationship of the Communist Party with the E.T.U. involved control. It had been alleged that most of the defendants had been at the material time members of Communist Party committees which controlled the Union and decided which candidates were to be nominated for Union office and by which methods their election was to be secured. In his Lordship's opinion, not only was the Union managed and controlled by the Communist Party, but so managed as to serve the ideals of the Party.

Mr. Blairford, a former member of the Communist Party, who gave evidence for the plaintiffs, had stated that from 1946 he had attended meetings of Communist supporters in the E.T.U. "In my judgment, the true assessment is that the committee was organised by the Communist section of the E.T.U. with the authority, assistance and co-operation of the Communist Party and it was not an organ, but a tool of the Party," commented the Judge.

Of Mr. J. Hendy, a defendant and a Communist member of the E.T.U. Executive, Mr. Justice Winn said: "He is a man of intellectual honesty as well as intellectual power. He would not adopt any course of conduct which seemed to him to be unjust to an individual unless his Communist tenets left him no choice. In his mind, no loyalty to the E.T.U. or any other body could be allowed to interfere with unswerving loyalty to the Communist Party and its ideals." Mr. Hendy had confirmed that gatherings of Union Communists were held before, during and after E.T.U. conferences to discuss matters of policy, elections and how to achieve by lawful means the defeat of candidates who would be critical of the Communist leadership. "There is no evidence from which the Court can infer that any Communist group ever decided that unlawful methods ought to be adopted."

He found that there was in existence in 1951, and presumably still in 1959, an organised group meeting regularly,

properly referred to as a "committee" but not as "an advisory committee." It discussed, recommended and, so far as Mr. Haxell concurred, decided what policies and aims should be pursued by the Union and what persons should be put into office to assist in that achievement. The fact that Mr. Haxell apparently asserted some sort of independence must have seemed like "heresy" to Mr. Hendy. Of Mr. Haxell, Mr. Justice Winn said he was "a most markedly dominant type of man, shrewd, ruthless and persuasive." Mr. Haxell had denied being chairman or member of a body called the National Advisory Committee of the Communist Party. "In my judgment," said the Judge, "that was an instance of swearing by the book." It might be literally true, but the truth of the matter which Mr. Haxell was trying to conceal was that a committee of the Communist members of the E.T.U. often met to foster Communist aims in the E.T.U.

When voting took place in each of the Union's 700 or so branches the votes were sent to head office, said Mr. Justice Winn. He found that the national scrutineers had no power to inquire into the eligibility of any member to vote or the qualifications of those who acted as branch scrutineers and signed the branch returns.

Disqualification of Votes

On the proper construction of the rules, the Executive Council had no power, either before or after a special investigation had been held, to reject for inclusion in the count for any election the votes of any one branch or any particular branch which was, or was thought to be, guilty of having infringed some rules. He found it more startling and difficult to accept that Mr. Haxell should have taken it upon himself to impose disqualification of votes returned by branches. "This practice was a rank abuse of power by the general secretary and illustrates the danger always inherent in the establishment of a quasi-full-time permanent post in such a body of part-time members. It is trite that usurped power corrupts even more absolutely than power duly conferred."

Mr. Haxell's action in disqualifying branch votes in the Cannon v. Frazer election in September, 1957, before the national scrutineers had met was

clearly *ultra vires* but no relief had been sought in that respect.

Failure to comply with the rules, which were of a complexity scarcely commensurate with the grasp of some members was no evidence of a fraudulent motive, continued the Judge. He found against the plaintiffs on the allegations that the defendants had wrongly failed to disqualify a number of branches which had voted for Mr. Haxell. There was, however, legitimate criticism of Mr. MacLennan who had shown injudicious and injudicial partiality in deciding not to arrange an investigation of one case such as he caused to be made in other cases. The facts were not sufficient to establish a fraudulent motive.

A number of other allegations, continued the Judge, did not amount to fraudulent practice by any of the defendants. That was not to say that some at least of the matters were not discreditable and should not have occurred in a properly conducted union.

Excess Ballot Papers

For the 1959 election a new plan for the issue of the ballot papers was introduced. The printers were given the actual numbers required at a later date and it was common ground that the total recorded by the printers as being over-printed was 26,833. It was a striking and sinister feature of the case.

Mr. Justice Winn considered that Mr. Humphrey deliberately ordered substantial excess quantities of ballot papers for branches where he expected members to support the Communist Party. Mr. Humphrey operated out of misguided loyalty to Mr. Haxell.

Mr. Haxell had said he knew nothing about extra ballot papers having been at head office until the beginning of this year. "It is a remarkable feature of the case which wholly discredits Mr. Haxell that he made no attempt to deal with this allegation that he had disposed of the extra papers until after the printer had given his evidence.

He next had to decide whether the allegation that surplus ballot papers were fraudulently used in certain named branches was established. "Of the 40 cases of alleged substitution, I find that 27 have been established to my complete satisfaction and a further four cases seem, on balance of probabilities, to have been proved," continued Mr. Justice Winn.

Of the 109 branches disqualified, 106 had produced a majority for Mr. Byrne and the remaining three produced a majority of only three votes for Mr. Haxell. "None of the three generals of the Union could offer any explana-

tion consistent with honesty for such a disparity. Nor can I."

Therefore, the scrutineers were caused by devices which could only have been fraudulent, to make their return in favour of Mr. Haxell. But for them, Mr. Byrne would, in his Lordship's opinion, have had a majority of at least 1,150, probably 1,500 and possibly more. "I must find that this result was achieved by a compound of forms of dishonest trickery," said the Judge. "It is not possible to determine who must have known of the plan to substitute envelopes. I am prepared to believe that neither Mr. Foulkes nor Mr. MacLennan participated in that. Their temperaments are, I believe, too prudent and, if the word is not inapt, squeamish, for such a crime. It has, in my judgment, the hallmarks of Mr. Haxell and Mr. Frazer, both of whom I judge to be blunt, unsubtle and ruthless. Agents must have been used, whom it is impossible to identify."

Mr. Scott, Mr. Justice Winn thought, would not have lent himself to such a fraudulent device.

The manner in which the Executive Council had dealt with the scrutineers' report on the election was of great importance. He was satisfied that Mr. Foulkes deliberately put the motion that Mr. Haxell be declared elected promptly to stifle discussion of the disqualifications. Mr. Sell made a speech in order to divert attention and to obstruct Mr. Chapple. Mr. Sell could not, however, be held guilty of any conspiracy.

So far as Mr. Cosby, Mr. Davies, Mr. Goldberg, Mr. West, Mr. Feathers, Mr. Scott and Mr. Batchelor were concerned the evidence and the inferences to be drawn did not come to the standard required to find against them. The cases of Mr. Goldberg and Mr. Hendy had caused the Judge particular concern. "Each has such intelligence and so much experience of union affairs that it is contrary to the balance of probabilities that he was ignorant of the rigging. Had that been the proper criterion I would have found them guilty. Each gave materially untrue evidence and I regard Goldberg as the not-very-scrupulous henchman of Haxell," said his Lordship.

On Monday Mr. Justice Winn heard legal arguments on the form of the orders he should make after his findings.

Mr. Gerald Gardiner, Q.C., for the plaintiffs, asked for a declaration that Mr. Byrne was validly elected and was now the general secretary of the Union. Mr. Neil Lawson, Q.C., for the defendants, opposed the applica-

tion, saying there were simple breaches of the rules apart from fraud and any member could challenge the validity of Mr. Byrne's election.

His Lordship said that though there was force in Mr. Lawson's submission he was bound to do justice and produce if possible a viable government for this important Union. It would be as good, as sound, and as real a result if he now declared—as he did—that Mr. Byrne was elected general secretary in December, 1959, and was from today general secretary.

Mr. Gardiner asked for an injunction restraining Mr. Haxell from acting as, or doing any part of the work of, general secretary, or of any office in the Union.

His Lordship said it would not be right to deprive the Union of Mr. Haxell's services. The members might well take a different view of this affair from his Lordship and could still elect Mr. Haxell to office. He would grant the injunction as proposed except that Mr. Haxell would be restrained from doing the work of any elective office unless duly elected thereto.

Mr. Gardiner sought an order that the Union should hold the forthcoming elections for the Executive Council under the supervision of the Electoral Reform Society.

Mr. Lawson said that there was no jurisdiction to make the order. He was prepared to offer an undertaking that, subject to certain matters, the Union's accountants, a firm in Manchester, would be responsible for the administration of the ballot. On this undertaking Mr. Justice Winn made no order on the application.

Costs

His Lordship said that the litigation had been caused by the obstinate refusal of the Union to agree that the election was invalid and all the defendants had asserted that Mr. Byrne was not validly elected. The Union and the five defendants would pay the plaintiffs' costs. There would be no reduction in costs because the plaintiffs did not succeed on all issues, for the defendants were dilatory as to discovery. The plaintiffs would pay £25 costs to the defendants Messrs. Shipman and Rengert, to demonstrate that they ought never to have been sued. There would be no order as to the costs of the defendants Messrs. Goldberg and Hendy. The remaining successful defendants would have their costs paid by the unsuccessful defendants.

Mr. Lawson, asking for a stay of execution, said that the five unsuccessful defendants intended to appeal. His Lordship refused a stay.

INDUSTRIAL NEWS

Holme Pierrepont Application Refused

IN the House of Commons on Monday the Minister of Power, Mr. Richard Wood, said he had decided not to consent to the application by the Central Electricity Generating Board to build a power station at Holme Pierrepont.

Mr. Wood said "More power stations on economic sites are urgently needed, but the inspectors whom I appointed to hold a public inquiry advise me that a station at Holme Pierrepont would seriously reduce an area of open country of particular amenity value very near Nottingham, and that the necessary movement of

coal by rail to the station would greatly intensify the city's traffic problems."

The application of the C.E.G.B. for the Minister's consent to the building of a 2,000 MW station at Holme Pierrepont was the subject of a public inquiry held by the Chief Engineering Inspector of the Ministry of Power and a Senior Inspector of the Ministry of Housing and Local Government during November/December, 1960, and January, 1961. The proposal was opposed by the Nottingham County Council, the other local authorities in the area and a large number of other organisations and individuals.

Electrical Production and Orders

THE output of the electrical manufacturing industry in the first quarter of 1961 was 3 per cent less than a year earlier and 7.5 per cent less than in the fourth quarter of 1960. Production was, however, rising throughout the quarter.

As can be seen from the accompanying table there was considerable variation between different products. Deliveries of switchgear and control gear and insulated wires and cables have continued to expand rapidly. The value of deliveries of domestic electrical appliances in the second half of 1960 was 10 per cent less than a year earlier but was recovering in the first quarter of 1961 when it was 2 per cent less than in the first quarter of 1960. Deliveries of rotating electrical machines, which include small motors for domestic appliances as well as the larger capital items, fell in the third quarter of 1960 but by the first quarter of 1961 were more than a year earlier.

Net new orders received by the engineering and electrical goods industries were again high in April.

The 18 per cent increase over last year was the same as in March, and, like the March figure, was inflated by some large orders for a new power station. Net new export orders fell sharply from the high rate in March. However, the index numbers of new export orders in the first quarter have been revised upward in the light of more complete information now available and it is now estimated that they were 4 per cent more than a year earlier.

STUDENTS' GUIDE

The Manchester and District Advisory Council for Further Education has published a booklet giving details of courses in various branches of engineering available in their area. The booklet covers full-time, part-time and evening courses and also courses for General Certificate of Education. Copies may be obtained from the Chief Education Officer, Deansgate, Manchester, 3.

DELIVERIES OF MAIN ELECTRICAL ENGINEERING PRODUCTS (£ MILLION)

	Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Rotating electrical machines	1960	31.5	34.6	29.3	38.8
	1961	33.0			
Transformers for lighting, heating and power	1960	11.1	10.0	10.4	11.5
	1961	11.2			
Switchgear and control gear	1960	29.1	28.1	27.7	30.9
	1961	32.2			
Other electrical machinery	1960	5.1	4.7	4.4	4.9
	1961	6.0			
Insulated wires and cables... ..	1960	33.2	33.5	30.0	35.4
	1961	36.4			
Domestic electrical appliances	1960	33.1	30.6	30.9	36.8
	1961	32.5			
Electrical equipment for motor vehicles, cycles and aircraft	1960	15.7	17.4	15.0	14.9
	1961	14.1			
Primary batteries	1960	3.1	3.1	3.6	4.3
	1961	3.8			
Secondary batteries (accumulators)	1960	6.6	6.4	6.0	7.2
	1961	6.2			
Electric lamps	1960	5.8	5.0	5.2	6.5
	1961	6.4			
Other electrical goods (except radio, telecommunication and other electronic apparatus)	1960	21.2	20.4	19.7	24.1
	1961	22.8			

Domestic Supplement—
Electric Fires—
at the end of this issue

Jackson Luton Factory to Close

As part of their plan to rationalise production facilities within the group, Radiation, Ltd., have decided to concentrate the manufacture of electrical products into one unit at the Parnall works at Yate, near Bristol. As a result the company's Jackson works at Luton will be closed down gradually during the next year and the Luton business will be transferred to Yate. During the same period manufacture of the electrical part of Radiation catering equipment will be transferred from Luton to the Palatine Works, Warrington.

In a statement, Radiation say that "a high level of output is planned at Luton for some months and the transfer of manufacture will be so planned and controlled as to ensure uninterrupted deliveries of both complete appliances and spare parts." They add that "the lengthy period of transfer should enable employees to get resettled without difficulty." For the present there is no change in the addresses to which orders for the products affected should be sent.

EUROPEAN COMPUTER ASSOCIATION

A European Computer Manufacturers' Association has been established with headquarters in Geneva. There are fifteen member companies, five from the United Kingdom (Associated Electrical Industries, Ltd., Elliott Brothers (London), Ltd., English Electric Co., Ltd., Ferranti, Ltd., and Lec Computers, Ltd.). The first president is Mr. C. G. Holland-Martin, research director, International Computers & Tabulators, Ltd.

The object of the Association is to further the adoption of data processing standards for the benefit of users and the industry. The primary purpose, in co-operation with national and international standards organisations, is to secure inter-company co-operation to enable European manufacturers to offer better products at less cost. This is to be accomplished through the establishment of system and equipment compatibility, the development of common system languages and other appropriate fields of activity. Three technical committees are in being and a fourth is being formed.

INDUSTRIAL NEWS *[continued]*

Thermo-Electric Cooler

FOLLOWING our description last week of the work carried out by the de Havilland Aircraft Co., Ltd., on thermo-electric cooling (p. 1148), we now publish the performance curve of the two-stage freeze dryer unit cooler for medical research. The performance figures given in our article last week were based on general parameters. The correct values for the freeze dryer unit can be obtained from the graph.

The bismuth telluride semiconductor material used by de Havilland in the construction of the devices is manufactured by Mining & Chemical Products, Ltd.

Changes in B.E.A.M.A. Price Formulae

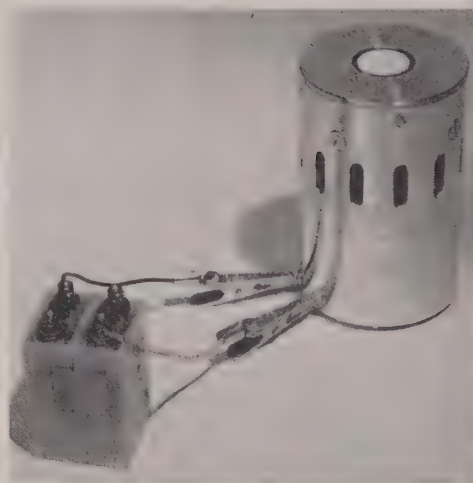
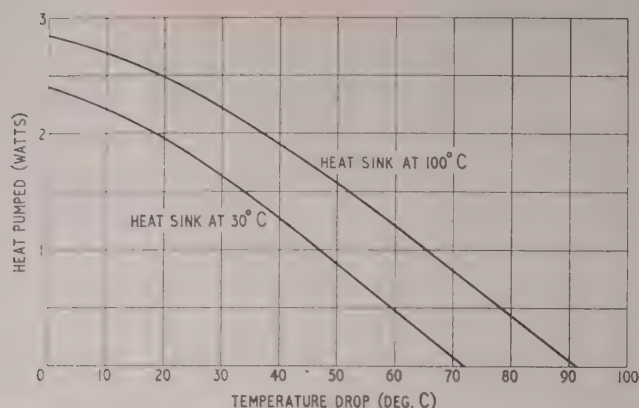
To bring the B.E.A.M.A. Contract Price Adjustment Formulae into line with current conditions, changes have been made in the wording of the supplementary clause and formulae relating to variations in rates of pay as follows: Sub-clause (a) Rates of Pay, of the Supplementary Clause and Formulae, for "the first three-fifths of the contract period," read "the first one-third of the contract period"; and for "the last two-fifths of the contract period," read "the last two-thirds of the contract period."

It should be noted that in the C.P.A. Formulae for Export Contracts the "contract period" reads "delivery period." There is no change in the part of the formulae dealing with variations in the price indices for materials.

FLUORESCENT FITTINGS

The "Super Slim" popular pack fluorescent-fitting, manufactured by Ekco-Ensign Electric, Ltd., has previously been made only as a switch start model. The 4ft and 5ft sizes will, however, now be available in a new switchless model, the "Slick-start," at an extra cost of 7s 7d (4ft) and 7s 8d (5ft), both for 230/240 V. The "Slickstart" will not replace the normal switch start model, which will continue to be available at the existing prices.

A similar announcement from Atlas Lighting, Ltd., Thorn House, Upper St. Martin's Lane, W.C.2, states that the "Popular Pack" fluorescent fitting is also available as a switchless-start version. The prices of these fittings are £4 2s (4ft) and £4 19s (5ft).



Above: Heat pumped/temperature drop curve of a two-stage freeze dryer unit. These measurements took place in laboratory atmosphere and the power consumption was 6 A at 0.7 V

Left: De Havilland thermo-electric cooler for medical research

Instrumentation for Dragon H.T.G.C. Reactor

ON behalf of the O.E.E.C. Dragon Project, the United Kingdom Atomic Energy Authority has awarded the contract for the instrumentation of the high-temperature gas-cooled reactor being built at the Atomic Energy Establishment, Winfrith, Dorset, to Automatic Control Engineering, Ltd. The contract provides for the purchase of all instruments and similar equipment by competitive tendering among firms in the territories of the signatories to the O.E.E.C. high temperature reactor agreement. A data logging system for recording approximately 900 variables and having facilities for pre-set alarm levels and digital display will be incorporated in the instrumentation

system. The contract is due for completion by December, 1962.

The Dragon Project is a joint effort for building a high temperature gas-cooled reactor to act as a prototype for the commercial power generating nuclear stations of the 1970's.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton	£186	0s	0d
COPPER, H.C. Electro	ton	£228	15s	0d
Fire Refined 99.70%	ton	£227	0s	0d
Fire Refined 99.50%	ton	£226	0s	0d
COPPER Tubes	lb	2s	3½d	
Sheet	ton	£264	15s	0d
H.C. wire and strip	ton	£285	5s	0d
LEAD, English	ton	£64	10s	0d
Foreign	ton	£63	0s	0d
MERCURY	flask	£66	0s	0d
TIN, block (English)	ton	£910	0s	0d
ZINC, G.O.B. Foreign	ton	£77	15s	0d
BRASS Tubes (solid drawn)	lb	1s	9½d	
Wire	lb	2s	8½d	
PHOSPHOR BRONZE				
Wire	lb	4s	2d	
PLATINUM	oz	£35	0s	0d
RUBBER, No. 1 R.S.S. spot	lb	24½d—24½d		

Underground Cables for Borrowdale

The North Western Electricity Board has decided to use underground cables instead of overhead lines in Upper Borrowdale. In a letter to the Friends of the Lake District, the chairman, Mr. T. E. Daniel, said that the Board had been impressed by the sincerity of their views and would not take advantage of the society's offer to contribute £5,000 towards the cost.

the switch that is silent...



that's the New Approach of

G.E.C.

'MUTAC CLIPPER'

G.E.C. Installation Equipment Group have a *new approach* to switch design which serves to take the clicking out of switching.

If you listen hard enough you *may* just hear the discreet whisper of a 'Mutac Clipper'.

Furthermore, the *new approach* makes 'Mutac Clipper' switches unrivalled for ease and speed of assembly . . . ensures that these precision-made, electronically-tested switches give a guaranteed long-life performance.

G.E.C.'s *new approach* enables you to put one, two or three 'Mutac Clipper' switches in a standard BSI 299 box. There's a choice of 44 different switch plates—in moulded plastic or metal—and 11 interchangeable units fit into just three different sized boxes:

- 5 amp 1 way S.P.
- 15 amp 1 way S.P.
- 5 amp 1 way D.P.
- 5 amp 2 way S.P.
- 5 amp 2 way & off
- 5 amp intermediate
- 5 amp 1 way secret
- 5 amp 2 way secret
- Bell Push
- Neon Indicator
- Blanking Unit

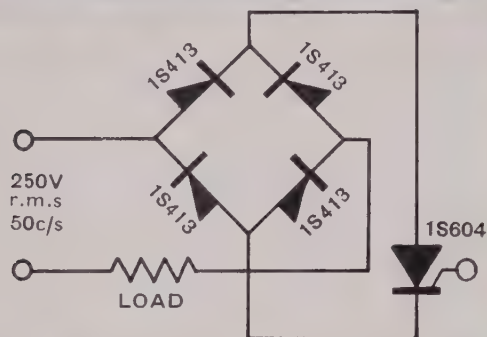
'Mutac Clipper' switches cost no more than ordinary switches to buy and far less to install—that's a result of G.E.C.'s *new approach*. Complete interchangeability of 'Mutac Clipper' enables you to standardise right through a job.

INSTALLATION EQUIPMENT GROUP

IMMEDIATE DELIVERY of all 'Mutac Clipper' switches from wholesalers throughout the country. If you would like more detailed information, ask your wholesaler for 'Mutac Clipper' literature.

THIS A.C. PHASE CONTROLLED SWITCH NEEDS ONLY ONE S.C.R. TO HANDLE FULL 850W LOAD

TEXAS SILICON CONTROLLED RECTIFIERS HIGHER EFFICIENCY REDUCES COSTS



ACTUAL
SIZE

The circuit shown requires only one silicon controlled rectifier, thus reducing costs in many applications. A.C. mains voltage is applied to a bridge rectifier in series with the load. The current is controlled by operating the silicon controlled rectifier, which is placed across the bridge, as a switch. The S.C.R. is fired by a pulse generator which can be based upon a complementary bistable circuit using Texas 2S301 and 2S701 silicon industrial transistors.

Type	Description	Peak Inverse Voltage and Forward Breakover @ 125°C • P.I.V. (V)	Max. Mean D.C. Forward Current		Max. Gate Current required to turn device on I_{GF} (mA)	Max. Sustaining Current I_H (mA)
			@ 65°C • I_O (A)	@ 125°C • I_O (A)		
1S600	Stud mounted device with an extremely small gating power requirement	50	3	1	20	25
1S601		100				
1S602		200				
1S603		300				
1S604		400				
1S610	Mounted in a standard TO-5 transistor case and having a 1A rating	50	1	0.3	20	25
1S611		100				
1S612		200				
1S613		300				
1S614		400				

*Stud or case temperature.

**THYRATRON ADVANTAGES WITH SEMICONDUCTOR RELIABILITY
PRODUCED BY TEXAS FOR INDUSTRY**

TEXAS



INSTRUMENTS
LIMITED

MANTON LANE • BEDFORD • ENGLAND

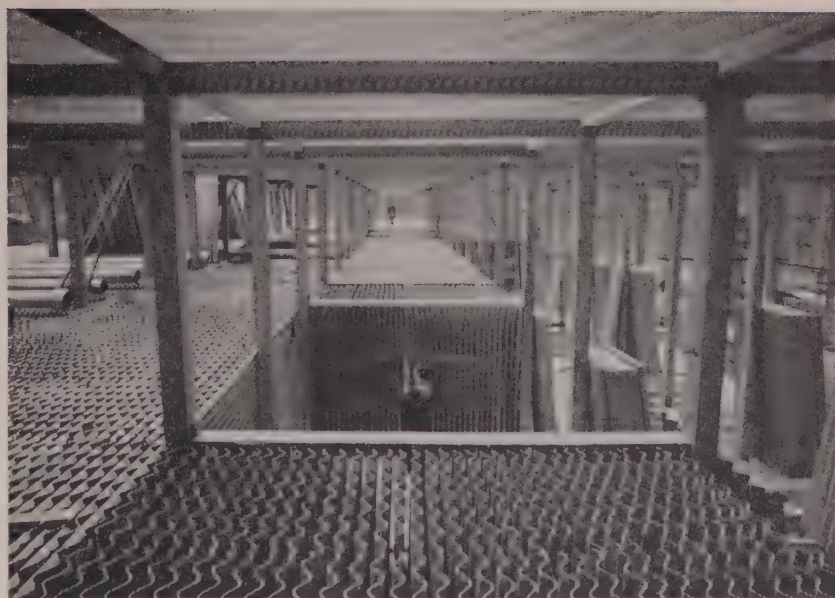
BEDFORD, 67466 • CABLES: TEXINLIM, BEDFORD

INDUSTRIAL NEWS *[continued]*

COOLING TOWER PACKING

IN an asbestos cement pack for cooling towers developed by the Universal Asbestos Manufacturing Co., of Watford, 6in corrugated sheets with the corrugations running vertically are interleaved with 3in sheets with the corrugations running horizontally. The multiple contact points between the corrugations give strength and rigidity to the packs, so that the sheets can be made somewhat thinner than the normal roofing grade. No spacers or other fixings are required. The first towers to contain packs of this type are at the new Padiham "B" generating station. They were designed by L. G. Mouchel & Partners and built by the Mitchell Construction Co. The two towers are 300ft high and have a diameter at pond sill level of 190ft. Each handles $3\frac{1}{2}$ million gallons of cooling water per hour and produces a temperature drop of about 18°F.

Precast reinforced concrete columns



Asbestos cement packing in one of the cooling towers at Padiham "B" generating station

and bearer beams are used to support the asbestos cement packs. At the perimeter of the tower is a ring of radial sheets, but the remainder are set in a series of rectangular packs and carry the spray pipes, which are fitted

on small precast bearers. The spray pipes are fitted with a series of distributor heads spaced at approximately 2ft 6in centres. Above them asbestos cement eliminator slats, made from a single 6in corrugation, are fitted into a series of splayed castellations on the side faces of the upper beams. These eliminators prevent small water droplets from being carried up and out of the tower, and keep water losses to the minimum.

C.E.G.B. "Good Housekeeping" Awards

MORE than 230 power stations in England and Wales have been competing for the Hinton Cup, the Central Electricity Generating Board's "good housekeeping" trophy. The cup, which all power stations, irrespective of size and age, have an equal chance of winning, was awarded this year to Stella North power station, Northumberland.

The Board's five regional directors select the best station in their individual areas. The five stations are then inspected by a national panel, headed by Mr. A. R. Cooper, member (operations and personnel) of the Generating Board. The four other stations inspected by the panel were Marchwood, Hampshire; Roosecote, Lancashire; Meaford "A," Staffordshire; and South Denes, Norfolk. Besides taking into account cleanliness and tidiness, the judges give consideration to any special difficulties under which particular stations have to operate.

Stella North power station, which was completed in 1956, has four 60 MW turbo-alternators. Since commissioning it has maintained a consistently high standard of performance and the annual thermal efficiency has never been less than 29.1 per cent.

A new "good housekeeping" prize for transmission sections, the Hinton

Trophy, has been awarded for the first time this year. The trophy, presented by Sir Christopher Hinton, was won by Luton Transmission Section. The award was made after five sections selected by the regional directors had been inspected. The other four were at Preston, Coventry, Wakefield and Carmarthen. The trophy is in the form of a half-fluted silver bowl weighing 74 oz.

1,700 Houses to Have Underfloor Heating

To meet the extensive housing and industrial development in the Irvine area, the South of Scotland Electricity Board is to reinforce its network by establishing a new 33/11 kV substation to the north of the town at Ravenspark, which will be fed from Saltcoats grid supply point. The scheme will cost approximately £156,000 and will be completed by the winter of 1962-63.

The Burgh Council is to build 1,700 houses, including 1,400 for Glasgow overspill. They will be all-electric and will incorporate electrical underfloor warming. The new substation will also supply the industrial development being carried out on the Royal Ordnance Factory site, and the new Skefko factory.

New Bearing Factory

A stone laying ceremony at Irvine, Ayrshire, on 20th June marked an important development in Scottish industry, for the factory, which is being built by the Skefko Ball Bearing Co., Ltd., of Luton, Beds., will be the only one in Scotland directly concerned with the manufacture of ball and roller bearings. The foundation stone was laid by the chairman, Sir Victor A. L. Mallet, G.C.M.G., C.V.O., using a silver trowel. It is anticipated that the new factory will start production in the autumn with an initial labour force of about 500 including office staff.

ENGLISH ELECTRIC WELDING EQUIPMENT DIVISION

From 1st July the welding business of English Electric is being co-ordinated in a newly formed Welding Equipment Division set up at the company's Accrington Works (telephone: Accrington 33241). The manager of the Division is Mr. R. H. Boughton, the chief engineer Mr. F. Mullery and the sales manager Mr. E. H. Ayres.

INDUSTRIAL NEWS *(continued)***G. A. HARVEY'S NEW PREMISES**

A handsome suite of offices on the first floor of Villiers House, Strand, London, W.C.2, for the senior sales staff of G. A. Harvey & Co. (London), Ltd., with an extensive showroom, were officially opened last week by Mr. Paul Reilly, director of the Council of Industrial Design. The construction,

furnishing and decoration are in tasteful modern style and the extensive windows ensure abundant light.

In the showroom are displayed examples of Harvey and Harvey-Milner steel office furniture and partitioning and in a reception area there are colour transparencies showing the products of other departments of the organisation—heavy and light fabrication, sheet metalwork, wirework, galvanising, etc.

Branch offices and showrooms of similar character have recently been opened in Bristol, Leeds and Glasgow, and others, in Manchester, Liverpool and Birmingham, are being opened this month.



Showroom area in G. A. Harvey's Villiers House suite

ELECTRICAL DEVELOPMENT IN LIBERIA

THE Liberian Government has signed a \$22 million agreement for a hydro-electric generating project with the Liberian National Electric Corporation (a Belgian company). Work will begin this month and the scheme will be completed by the end of 1965. When power begins to be generated from the Mount Coffee hydro-electric plant which is to be constructed on the Saint Paul River it will be sold at 2 cents/kWh for fifteen years, after which the charge will be halved. The agreement gives the company rights to generate and transform electricity in Liberia for fifty years and the

Government holds 25 per cent of the company's shares.

The agreement is the result of the Liberian Government's long efforts to seek a means by which a hydro-electric power scheme could be developed to obtain low-cost power supply both for domestic and industrial use and to accelerate Liberia's economic growth.

Turbo-electric Liners

Associated Electrical Industries, Ltd., tells us that on her maiden voyage the P. & O. Orient liner *Canberra*, which has turbo-electric propulsion, passed the *Strathaird* heading homeward on her last voyage before going to the shipbreakers. The *Strathaird* (1932) was a sister ship of the *Viceroy of India* (1929), sunk during the last war, and the *Strathnaver*, and all of them were turbo-electrically propelled by machinery made by the A.E.I. The *Strathnaver*, slightly younger than the *Strathaird*, remains in service.

INDUSTRIAL ART BURSARIES

The Royal Society of Arts has announced details of this year's Industrial Art Bursaries Competition, prizes for which amount to the record sum of £5,875 and take the form of travelling bursaries, in most cases of £150 each. The competition is open to students attending an art, architectural or technical college, and to other young designers who intend to take up industrial designing as a career. Bursaries are offered for the design, *inter alia*, of domestic electrical appliances and electric light fittings (two bursaries).

A number of supplementary awards are available from the Art Congress Studentship Trust, the Owen Jones Memorial Trust, and the George M. Whiley Fund. The closing date for entries is 9th October next. Inquiries should be addressed to the Bursaries Officer, Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2.

ELECTRONIC INSTRUMENTS

More than 300 visitors attended the "open house" week at Livingstone Laboratories from 29th May to 2nd June at their new building at 31, Camden Road, London, N.W.1. In addition to being able to see over the building, visitors inspected an exhibition of electronic test gear. Notable amongst the instruments shown were a number of new oscilloscopes from the "Tektronix" range, while equipment from Hewlett-Packard and the associated companies of Boonton Radio Corporation and F. L. Moseley could be seen in the Hewlett-Packard demonstration van.



The above photograph shows part of the new applied research department of Alfred Herbert, Ltd. We regret that inadvertently an illustration from another article was published by mistake with the report of the opening of the new premises in last week's issue (page 1161)

Londex Silver Jubilee

Formed in 1936, Londex, Ltd., has recently completed 25 years as a manufacturer of automatic electrical controls. During this time the company has progressed from a one-room establishment to two large factories employing 400 persons, and its range of products has been extended from the initial manufacture of relays (of which something like two million have been produced) to complete automation plants including controls of level, flow and pressure, using the latest methods including electronics.

A 52-page illustrated data book of the company's products has been issued and is available to any interested persons from the company at Anerley Works, 207, Anerley Road, London, S.E.20.

KELVINATOR PRICE REDUCTIONS

Reductions in the prices of their range of British-made domestic refrigerators have been announced by Kelvinator, Ltd., in an attempt to stimulate sales in the home market. The reductions, which come into effect immediately, are: "Lady K" 3.1 cu ft 45 gns (reduction 5 gns); model K46ZP 4.6 cu ft 62 gns (5 gns); model K60M 6 cu ft 72 gns (8 gns); model K77M 7.7 cu ft 89 gns (£15 11s); model K94M 9.4 cu ft 106 gns (£13 14s); model K94MD 9.4 cu ft 110 gns (£19 10s). All the foregoing prices include purchase tax.

Trade Announcements

Mr. R. A. V. Noakes is joining **Walmore Electronics, Ltd.**, as their area representative for London E., E.C., and S.E. districts, Kent and Sussex.

Sunbeam Electric, Ltd., have opened their first service station and sales centre in Northern Ireland at 37, Chichester Street, Belfast (telephone: Belfast 27157).

Berry's Electric, Ltd., have appointed Mr. E. H. Hemmings as their representative in the Merseyside and North Wales Electricity Board area.

South Wales Switchgear, Ltd., is extending the range of manufacture in its Scottish factory at Glasgow to include medium voltage switchgear.

Calendar

We have received from Craven Brothers (Manchester), Ltd., a calendar (July, 1961, to June, 1962) each sheet of which bears an illustration of one of the company's machine tools.

PARLIAMENTARY REPORT

Colour Television in Three Years?

The Postmaster General, Mr. Bevin, told the House of Commons last week that with a decision on line standards in the next six or twelve months there might be a limited colour television service in about three years' time. He had been asked by Mr. Loveys, in view of his decision against a limited colour service by the B.B.C., to give further details about progress abroad. Mr. Bevin said that three countries had public colour services. In the United States after seven years there was about one colour set in 100; in Japan it was about one in 7,000 and in the U.S.S.R. the public saw colour TV only in "Palaces of Culture." Prices of sets ranged from £210 in the U.S.A. to between £420 and £520 in Japan. All three countries used the United States system or a variant of it and tubes based on the American "shadow-mask" type, an improved version of which had recently been introduced. An alternative was the "Secam" system developed in France but he did not think it offered advantages over the American system.

Mr. W. R. Williams said that as practically all the technical experts in the B.B.C. and the industry responsible for the development and manufacture of equipment felt that 625 lines was the appropriate standard, what additional technical information could be made available to the Pilkington Committee? Was not the Minister dragging his feet?

Mr. Bevin said they could get over the technical problems but the wider social and economic implications had to be considered very carefully. He agreed that present indications were that colour could be introduced at least as successfully on 625 lines as on 405. In that connection the B.B.C.'s colour transmissions in Band V next year would be an important experiment. The first and fundamental question to be settled was whether or not the higher line standard should be adopted. Once that was settled progress in colour should be possible.

Line Standards

Mr. Bevin also said it was perfectly open to the Pilkington Committee to give him an interim report on television line standards. Mr. Mason had asked him to what extent he received regular advice from his Television Advisory Committee. Mr. Bevin said that the last advice was given in the Committee's report in 1960. It was still considering the question of technical parameters for 625-line television but

the question of future definition in all its aspects was before the Pilkington Committee.

Mr. Mason said that the Committee had given the Postmaster General strong advice that it would be in the best interests of television if there were a switch from 405 to 625 lines. "Bearing in mind that, by making the change, we could provide better definition, we could come into line with the European standards and, also, we could give our television industry a better exporting chance, is it not obvious that this will be a recommendation from the Pilkington Committee and ought not the Minister to short-circuit it by asking for an immediate recommendation?" asked Mr. Mason.

Mr. Bevin said he did not think anything was obvious in politics and government but what Mr. Mason had said was not unwelcome.

Mr. Mason said that time was most important. If we could now have an interim report from the Pilkington Committee before its main report, due in about 12 months, would that not be a great advantage to the television industry as a whole? Mr. Bevin said he was also conscious of that.

Euratom

Mr. Mason asked the Parliamentary Secretary for Science what consideration he had given to the effect on the relationship of the United Kingdom with Euratom which would result from joining the Common Market, particularly in respect to full membership of Euratom and its effects upon the U.K. nuclear power programme.

Mr. Freeth, in a written answer, said that if the United Kingdom were to become a member of the European Economic Community the question of joining Euratom would also arise. Exploratory talks were now taking place to ascertain whether a basis for negotiations could be found with the E.E.C. It was only when the position in that respect was clearer that it would be possible to consider the consequences for the U.K.'s relations with Euratom.

Electrical Engineers Exhibition Dinner

The second Electrical Engineers Exhibition dinner is to be held at Grosvenor House, Park Lane, London, W.1, on Thursday, 28th September. Applications for tickets (£2 2s each) should be sent to the General Manager, Electrical Engineers (A.S.E.E.) Exhibition, Ltd., 6, Museum House, 25, Museum Street, London, W.C.1.

NEW ELECTRICAL EQUIPMENT

DIGITAL VOLTMETER

A flush panel digital voltmeter, type LM902.2R for standard 19in rack mounting, is announced by SOLARTRON LABORATORY INSTRUMENTS, LTD., Cox Lane, Chessington, Surrey. Direct current voltages from $100 \mu\text{V}$ to 1.599 kV are presented as a four-digit display in decimal form with polarity discrimination. Display is by optical projection. Red and black backgrounds signify positive and negative inputs respectively. Voltage measurements are covered in five ranges. The input impedance is $10 \text{ M}\Omega$, except in the two lower ranges, which have values of $1 \text{ M}\Omega$ and $100 \text{ k}\Omega$. The long-term accuracy is ± 0.1 per cent of maximum reading on each range. Two additional high-impedance voltage ranges of 100 V and 1 kV have input impedances of $100 \text{ M}\Omega$ and a measuring accuracy of ± 0.5 per cent. The read-out time is constant at 280 msec irrespective of the voltage input, which may be "floated" up to 700 V with respect to earth. A "check" position on the range switch permits zero setting and a calibration check. The internal zener reference can be preset to its precise value and corrected if necessary against the built-in Weston standard cell.

Under normal (auto) operation volt-

ages are measured continuously, any variations causing the instrument to display a new reading. An adjustable "dead zone" can (within limits) make the instrument insensitive to small changes in voltage. Thus, it is possible to obtain steady readings in the presence of small transient changes. Ripple components at 50 c/s that may be present on the voltage to be measured can be attenuated or rejected by switching in short or long time constants on the input circuit. When switched to the "sample" mode of operation a single voltage reading is taken, either by manual operation of a panel button or by remote electrical command. This reading will remain on display until a succeeding sample is taken.

Two 50-way sockets at the rear provide decimal coded digital information, polarity and print command signals suitable for feeding into a Venner TSA65 printer and an additional display unit.

CRANE CONTROL EQUIPMENT

An addition to their range of crane control equipment is announced by DEWHURST & PARTNER, LTD., Inverness Works, Hounslow, Middlesex. Available in two sizes, for crane ratings of 50 and 100 A respectively, each set of equipment comprises a drum controller, a protective panel and a resistance cubicle. The equipment is suitable for use with six-terminal

squirrel-cage and slip-ring motors on a maximum of 550 V. The drum assembly is fitted with individual arc shields for each contact and is enclosed in a weatherproof sheet steel case.

Additional features available include a spring return to the "off" position and an "off" position interlock with two shunt limit contacts. The protective panel is fitted with the new "Dupar H" type triple-pole main contactor and is suitable for two-, three- or four-motion cranes, fitted with two overloads per motion as standard. The resistance unit is enclosed in a protected type case.

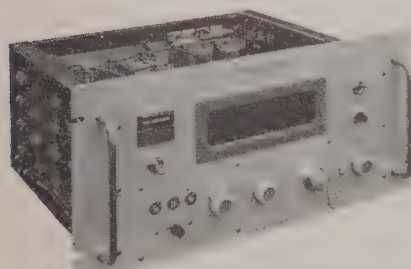
RELAY CONTACTOR

Added to the range of relays manufactured by the KEYSWITCH CO., 2, Irongate Wharf Road, Praed Street, London, W.2, is a silent relay contactor, which operates on a 230 V supply. The contacts are rated for 30 A switching. Screwed terminal connections are incorporated and the unit, measuring 4in by 2in by 2in, can be supplied unhusd or enclosed in a transparent cover.

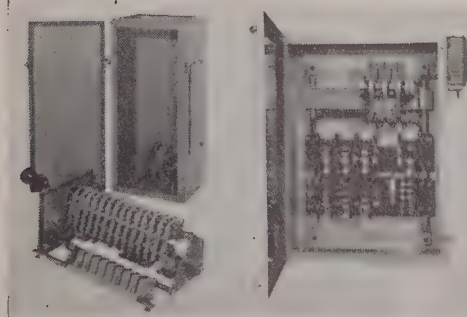
CONNECTOR ASSEMBLY

The connector assembly introduced by the G.E.C. INSTALLATION EQUIPMENT GROUP, Four Ashes, Wolverhampton, can be incorporated in circuits up to 660 V. The assembly consists of a plated brass terminal unit and a porcelain block, a large number of these being held in a galvanised steel channel unit.

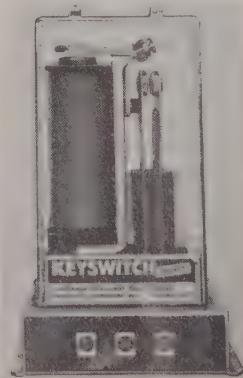
Any individual connector can be removed from this channel without dismantling the bank of connectors by slackening a retaining end-clamp and



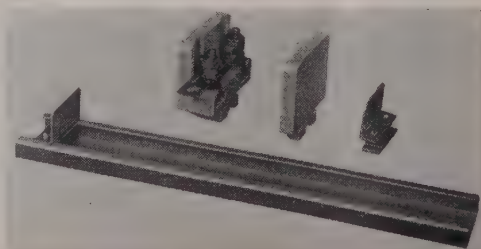
Solartron flush panel digital voltmeter



Dewhurst crane control equipment



Keyswitch 30 A relay contactor



G.E.C. connector assembly unit

Morphy-Richards type STA steam-or-dry iron

sliding the connectors along the channel, turning the selected connector through 45° and lifting it clear. To achieve this, the base of the porcelain block is chamfered. A press stud hole in the top of the block allows a cover to be fitted, and there is a groove in the side of the block to hold an index card. The assembly is non-tracking and suitable for use in humid atmospheres. Three sizes, a telephone unit, a 30 A unit and a 40 A link unit, fit into a standard size of channel.

COFFEE POT PRICES

The prices of the Russell Hobbs ceramic coffee pots have been increased as from the beginning of July. The a.c. only models now cost £5 5s (previously £4 19s 2d) and the a.c./d.c. models £5 9s 2d (previously £5 3s 4d). The matching sugar basin and cream jug have been increased from 12s 7d to 16s 4d. All prices include purchase tax. The changes are largely due to an increase of costs in the British pottery industry.

STEAM-OR-DRY IRON

A new steam-or-dry iron, to be listed as the STA, will shortly be placed on the market by MORPHY-RICHARDS (CRAY), LTD., 50, Conduit Street, London, W.1. A thermostatically-controlled model, it has several new features, including a pushbutton switch, which enables the iron to be changed from steam to dry or vice versa; increased steam area coverage; and a reversible flexible outlet for left-handed users.

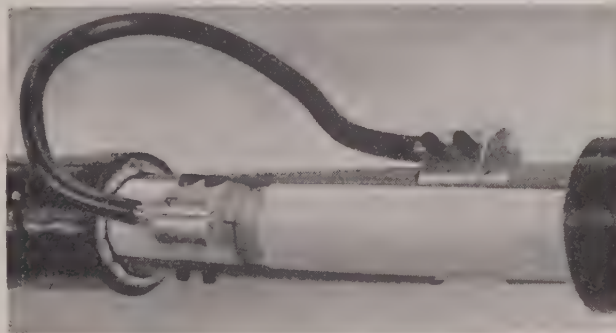
It is fitted with a 1,100 W heating element and, when switched from cold, the iron is ready for ironing within 90 sec. It is designed for use with ordinary tap water and attention has been given to avoiding the need for frequent descaling, even where the water used is exceptionally hard. Any descaling which may eventually be required can be carried out by the company's service department.

The iron is designed on modern lines with the red pushbutton switch fitted at the top of a black moulded handle which sweeps behind the iron to form an insulated heel rest. The water filling hole is in front of the handle and below this is the fabric

selector dial. The heat control can be set on any of eight different settings. The sole plate, which has 15 steam vents, has a bevelled edge for ironing under buttons. The capacity of the water tank is $\frac{1}{2}$ pint and the total

weight of the iron is 3 lb 8 oz. Models are available for the 200/220, 220/240 and 250 V ranges, a.c. only. The price is £3 15s plus 13s 6d purchase tax.

Clip-on Service Connection for "Solidal" Cable

*Loop connected with clip-on termination for load-cycling tests*

A clip-on type house service connection has been developed by Aluminium Laboratories, Ltd., Banbury, for use with "Solidal" cable, which is plastic insulated and has solid sector-shaped aluminium conductors. This clamp is formed of two pieces of extruded aluminium section held together by high tensile steel screws. When screwed together the two halves grip both the solid segmental conductor and the service conductor. Contact is obtained without complete encirclement of the conductor and this means that only very slight separation of the cores, up to about $\frac{1}{16}$ in, is necessary. This elimination of the need for core separation permits reductions in the sizes of joint boxes.

The clamp has undergone rigorous load cycling tests arranged so that the behaviour of the joint interfaces between the main conductor and clamp and service conductor and clamp could be separately studied. Service cables were attached to lengths of "Solidal" cable to form loops through which current was passed to give a maximum conductor temperature of 80°C. This maximum value was selected as being sufficiently in excess of the present specification maximum of 70°C which is allowed with p.v.c. insulated cables to provide realistic test conditions.

Provision was made in the looping arrangement for the lengths of service conductor to pass such a proportion of the total current as was necessary to obtain the required temperatures throughout the assembly. The specimens have so far been subjected to about 10,000 cycles of half-hour heating and half-hour cooling; resistance measurements taken at intervals throughout the tests showed that the joints were electrically stable. These tests were carried out on clip-on clamps applied to two intermediate sizes of "Solidal" cable, and similar tests on 400 A 0.471 sq in cable are now in progress—the joints still being stable after 4,000 cycles.

Simulated short-circuit tests have been conducted by the E.R.A. on a series of clamps fitted to an intermediate size of "Solidal" cable. In one instance a short-circuit current of 10.7 kA for 0.09 second melted the service conductor yet the joint remained stable, the resistance between the main and service conductors increasing from 36.1 $\mu\Omega$ to 37.2 $\mu\Omega$. A number of trial house services using clip-on clamps have been installed by Area Boards in this country and by European utilities. The clamps are being manufactured commercially by ERMA, LTD., Alpertons, Middlesex.

Soviet Engineering at Earls Court



Artist's impression of the "Atoms for Peace Hall"

ELECTRICAL and nuclear engineering are featured prominently in the Soviet Exhibition which opens at Earls Court, London, today (Friday).^{*} The interior of Earls Court has been transformed into 22 halls and these are divided between the sections of the exhibition which cover Science, Industry, Transport, Building, Agriculture, Education, Public Health, Consumer Goods and Culture. In addition, an introductory section portrays the overall development of the Soviet economy. There are some 10,000 exhibits.

Like the British Trade Fair in Moscow, this reciprocal Soviet exhibition in London is a trade and industrial display, though very different in form to the usual trade exhibition as we know it in this country. If the presentation is designed to be descriptive and educational, the main aim of the exhibition is to promote British trade with the Soviet Union. In fact the success of British

^{*} The exhibition is open every day, except Sundays, from 10 a.m. to 10 p.m. until 29th July.

efforts to increase exports to Russia will depend to a great extent on the willingness of business men in this country to buy an increasing quantity of Russian goods. Examples of what the Russians have to offer in the way of electrical equipment and instruments are shown against a background illustrating the development of the country's power resources.

Dominating the electrical hall is one phase of a 500 kV, 20,000 MVA air-blast circuit-breaker and alongside this is a model of the substation of which it forms a part. A surge arrestor is also shown. The installed capacity of generating plant in the Soviet Union has grown from 1.08 million kW in 1913 to 42.8 million kW in 1958 and during the next five years an increase to 92 million kW is planned. This development is portrayed by means of wall charts and there is a large illuminated map on which coloured lights indicate the position of power stations and transmission lines at present operating, under construction or planned. Among the many models is one, measuring 6 metres across, of the giant Bratsk hydro-electric station. When completed this station will have an installed capacity of 4.5 million kW and an annual output of 22.6 billion kWh. The station operates with a head of 105 metres and the first two of the 20 generating units will be commissioned later this year.

There is also a model of a typical thermal station of 2.5 million kW capacity and alongside this is an enlarged model of one of the 950 tons/hr pulverised fuel boilers. Another example of thermal station design is a 400 kW station for combined electricity generation and district heating.

A wide selection of equipment and apparatus is also being shown, including electric motors, examples of ferro-concrete and metal towers for h.v. transmission lines, and a silicon element from a solar battery. Electrical items in other sections of the exhibition include ultrasonic generators and electron microscopes, automatic control systems, apparatus for electric-spark processing of metals, and automatic plant for the electric alloying of metal



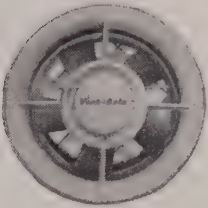
The 625 MW outdoor hydro-electric power station at Kremenchug

[Continued on page 31]

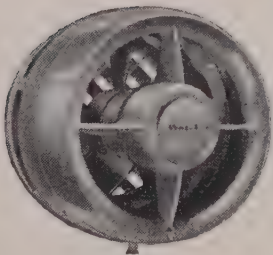
BIG NEWS FROM VENT-AXIA

WINDOW MODELS *in black or ivory*

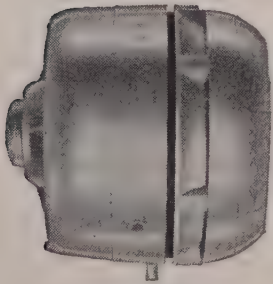
6"



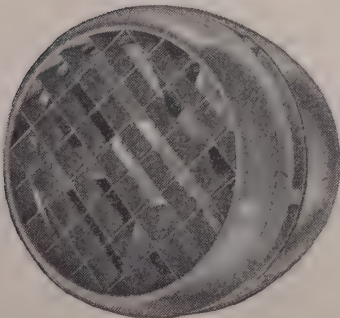
7½"



9"



12"



Vent-Axia introduce a complete new range of elegant window and wall models. Both types are virtually silent and can be equipped with a variety of optional fittings.

- * Inbuilt automatic shutter to prevent backdraught.
- * Choice of Control: Single Direction (Type SD) or Reversible (Type R), both giving three speeds including boost for extra performance.

Here is ventilation, just as you want it, at the turn of a switch.

Vent-Axia

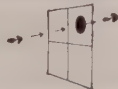
60 Rochester Row · London S.W.1

Telephone: VICtoria 2244

BRANCHES AT GLASGOW · MANCHESTER

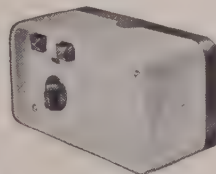
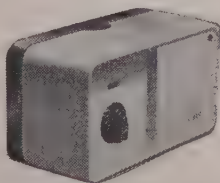
BIRMINGHAM · LEEDS

NEWCASTLE-UPON-TYNE · BRISTOL



A MEMBER OF THE HALL-THERMOTANK GROUP

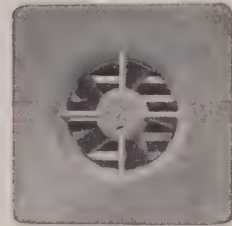
CONTROL SWITCH
TYPE R



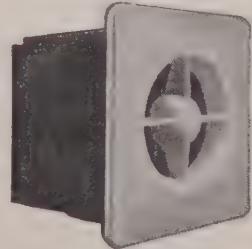
CONTROL SWITCH
TYPE SD

WALL MODELS *with ivory fascia*

6"



7½"



9"



12"



VENT-AXIA FOR BETTER AIR CONDITIONS



takes the lead . . . always

DOUBLE SECURITY

The Members of the
ASSOCIATION OF STEEL CONDUIT MANUFACTURERS
are united in their determination to maintain the
HIGH AND CONSISTENT QUALITY OF THEIR PRODUCTS.

THE A.S.C.M. MARK

is a guarantee of the fulfilment of this intention and also to the
fact that A.S.C.M. Conduit conforms to B.S. Specification 31.
A.S.C.M. methods of production and the self-imposed high
standards achieved ensure just that

EXTRA SATISFACTION AND SECURITY

by which Architects and Consulting Engineers can make
absolutely sure of the reliability of the electrical installations
for which they are responsible.

**SPECIFY A.S.C.M.
AND ENJOY THIS DOUBLE SECURITY**

A.S.C.M. MEMBERS

General Electric Co. Ltd.
Incorporating :
The Oriental Tube Co. Ltd.
Metallic Seamless Tube Co. Ltd.
Monmore Tubes Ltd.
Simplex Electric Co. Ltd.
Incorporating :
Credenda Conduits Co. Ltd.
Simplex Conduits Ltd.
Stella Conduit Co. Ltd.
Walsall Conduits Ltd.
Electrical Conduits Ltd.
Hildick & Hildick

surfaces. Ultrasonic transducers made of ceramic magnetostrictive and piezo-electric materials are shown. The use of electricity in the Russian steel industry is illustrated by models. There are examples of radio and television sets and colour television is demonstrated. During the exhibition over 100 technical films will be shown.

Nuclear Power

Because the Soviet Union has, for the present, adequate resources of conventional fuels, development of nuclear power is spread over a number of different types of reactor. The aim is to accumulate design and operating experience which will enable the economic advantages of various reactor systems to be evaluated in order to determine the most promising line for large-scale development when this is needed. Models of some of the stations now operating or under construction are shown, including the original Russian station commissioned in June, 1954, and the

600 MW Siberian station of which one 100 MW section is at present on load. There is an impressive model, 20ft long, of the ice breaker *Lenin* which has part of the hull cut away to reveal the reactor and machine hall. A film of its construction and operation is being shown alongside.

Much attention is given to thermonuclear research and visitors can see a model of the impulse ionisation chamber "Alpha," for investigating alpha-radioactive preparations, and models of what is claimed to be the world's biggest magnetic trap "Ogra." There are also instruments used for the study of plasma.

The Russian achievements in space are illustrated in a hall built in the form of a cylinder 100ft high in which the visitor will imagine himself "in the grip of cosmic space." Films of the launching of satellites are shown simultaneously on five screens and there are models of satellites and space-ship containers.

INDUSTRY AND THE HOUSE

Great Britain and the "Six"

By AUSTEN ALBU, M.P., B.Sc., A.M.I.Mech.E., M.I.P.E.

THE accelerating pace of the Government's interest in the European Economic Community has created a strange alliance in Parliament between the extreme Right and the extreme Left, to both of whom the thought of Britain's becoming part of the Community is anathema. On the other hand, there are a growing number of members in favour, subject to a greater or less degree of prior negotiation. The bulk of members, however, follow their leaders in refusing to commit themselves and just wait and see. The tiny Liberal group, rather strangely sensing the old battle for free trade in the present arguments, unhesitatingly supports our entry into the Community.

Having won in the ballot to move a motion in a three-hour debate, Mr. Sydney Silverman, that inveterate individualist of the Labour Left, moved a resolution whose terms urged the Government to take no action until empowered to do so by a Conference of Commonwealth Prime Ministers and the House of Commons, but which was clearly hostile to the whole idea. Mr. Silverman is at present outside the pale of the Labour Party whip, from which he was excluded for one of his periodic bouts of intransigence and, being therefore the leader of an independent party, is, as Mr. Nigel Birch said in a witty speech, "performing the useful function of a parliamentary minicab."

Mr. Silverman's opposition stemmed from his belief that this was not a move towards the unity of Europe but towards its perpetual division. He said that there could be no European unity without Central Europe and he referred to the neutrality of Sweden, Austria and Switzerland which would prevent them joining. He went on to refer to the dangers to the Commonwealth, which brought him the unaccustomed support of the group of Tories, vociferously led by Lord Hinchinbrooke, in whom the nostalgia of Empire remains the main political force.

Mr. Silverman's motion had attracted an unprecedented number of amendments, but the one selected by the Speaker was in the name of Mr. Gilbert Longden, a Conservative, and it gave cautious support to the Government's negotiating Britain's entry into the Community. He thought we should long ago have taken the opportunity offered by Article 237 of the Treaty of Rome to negotiate terms for our entry. He recognised, as every speaker did, that the issue was not primarily an economic but a political one and he referred to the need for Europe to unite to defend its way of life against Communism.

There followed two brilliant speeches which demonstrated how good debate in the House of Commons can be when the issue is one that moves men to real feeling and when the whips are not on and opinions may be changed by argument. The first was by Mr. Roy Jenkins, from the Labour side. He pointed out the illusions entertained by those who believe that the Commonwealth represents an alternative to a European organisation. Economic and political unity in the Commonwealth had been becoming looser and not tighter. He said that it was primarily the old, white Commonwealth members who were opposed to Britain's joining Europe and not the new Commonwealth which was primarily interested in Britain and other countries as a source of capital. They were also going to be interested in markets for the simpler manufactured goods. It would be much better to have the whole of Western Europe helping us in the problems this would create for our industries, rather than attempt it all on our own. Mr. Jenkins finished by a plea that we should recognise our true position in the world, contribute what we could to this great new movement in Europe and at the same time get a badly needed injection of dynamism into our rather stagnant economy.

From the opposite benches Mr. Nigel Birch, an ex-

Treasury Minister, said he wanted to look not at the minor objections but at the big arguments. He believed that the "Six" signed the Treaty of Rome because they saw and understood that a change of scale had come about in world affairs. No longer was it possible for one country to struggle for the hegemony of Europe. Today the unity of Europe was vital to our defence. The change of scale applied to weapons and to economics. The Americans would spend next year on space research and missiles £1,000 million more than we spent on the whole of our defence. Similarly, in economic affairs the expense of research was rapidly increasing and could only be sustained by a big market. Factories and plants tended to get larger and the advantages of specialisation were increasing. The "Six" might well surpass America in the near future in the production of goods and services. If we did not join, the disadvantages would not be confined to economic affairs. The foreign policy of the "Six" was being increasingly concerted between themselves. Mr. Birch went on to criticise what he called the reversion to the dreams of Joseph Chamberlain and pointed out our inability to provide the capital the Commonwealth needed to hold it together. He finally dealt with the question of sovereignty and felt that there was a danger of this country getting out of the main stream and into a backwater, of mistaking memories for hopes.

After a demagogic speech in support of the motion from Mr. Shinwell, a naïve one from one of the Tory imperialists, Mr. Biggs-Davidson, and a wind-up by Mr. Michael Foot, the Speaker decided, to the disgust of the extremists on both sides, that he had not heard sufficient views to allow the question to be put.

No Government Bill can have received such a mauling during all its stages as the North Atlantic Shipping Bill. Without a friend, except those representing shipbuilding constituencies, it nevertheless got its third reading last week. Not surprisingly, the Labour Party was indignant at the decision of the Air Transport Licensing Board to allow Cunard-Eagle to fly scheduled services across the Atlantic in competition with B.O.A.C. and claimed that they could do this all the easier because they were receiving a subsidy for their shipping activities. Criticism of this kind was not confined to Labour members, but included such pristine Conservatives as Mr. Higgs, the member for Shipley.

Your correspondent suggested that if the proposed new Cunarder was to be built it should be a ship of very advanced design which might put the shipbuilding industry years ahead of its competitors. He said he believed that the specification was very conservative; for instance, it asked for 150,000 s.h.p. although the *Queen Mary*, which was 6,000 tons larger, had only 160,000. Did the Cunard Co. believe that there had been no progress in the design of hulls or machinery in the last 25 years? He referred to the *Canberra* whose engines had not been built by the marine engineering industry but by an electrical firm. He hoped that tenders would be sought from a wide variety of sources so that the engines would be of the most advanced design.

The Minister of Transport, in reply to these points, defended the large ship and said that the engines would be of advanced design but not revolutionary. To go further would risk irregularity in service. The steam conditions specified called for machinery of the highest present-day

standards. The specification by the Cunard Company was a broad one and the tenderers had scope for varying the precise dimensions and power. The Yarrow Admiralty Research Department and firms outside the marine engineering industry had been consulted. Y.A.R.D. would be used when the contracts were assessed.

There is a strong belief in the House that the Minister is not happy with this Bill, which is the outcome of an unhappy Conservative Party election pledge. It seems doubtful whether the Cunard Company is very happy about it either. If the design that emerges is really an advanced one and not one cut down to price, it may well be that the cost of a ship on this scale will be so high that she will never be built.

New Books

Induction Heating: Coil and System Design. By P. G. Simpson. Pp. 295; figs. McGraw-Hill Book Co., Inc., 95, Farringdon Street, E.C.4. Price 89s.

Of the relatively large number of books published on induction heating, only four or five are of real value to the engineer engaged in the day-to-day design of equipment. The present volume is therefore all the more welcome.

It begins with a mathematical treatment of the basic theory, and while some of the methods used may arouse suspicion, the final results accord well with normal practice. The chapter on heat flow and temperature distribution contains much useful information. At a later stage, the formulae derived in these two chapters are applied to the practical design of heating inductors for various types of charge, with worked examples to illustrate the methods used.

A section on general applications deals with through heating, brazing, surface hardening and melting. It is regrettable that melting furnaces in particular are very poorly covered, and vacuum melting techniques are scarcely mentioned. A complete radio frequency heating system is described, including the detailed design of the generator, and a special section is included on r.f. transformers. (Here, it should be noted that equation 5-39 tends to $\sqrt{2}$, not 1, and equation 5-46 should be multiplied by L_T , to give an answer of $24 \mu H$ in the particular problem.) Similar treatment is accorded both machine frequency and mains frequency equipment, aluminium and steel billet heaters being the only units described in the latter category. Unfortunately, no mention has been made of the growing use of induction heating in the chemical industry for large vessel heating.

With the exception of the two major omissions mentioned, the induction heating field is well covered, and there is in addition an excellent bibliography. This is a book primarily for the engineer experienced in the subject, who will know how to apply the methods described. It can be thoroughly recommended.—M.G.G.

Books Received

Electrical Engineering. By S. B. Hammond. Pp. 566; figs. McGraw-Hill Publishing Co., Ltd., 95, Farringdon Street, London, E.C.4. Price 68s.

Aircraft Electrical Practice. By Lewis F. Wainwright. Pp. 320; figs. Odhams Press, Ltd., 96, Long Acre, London, W.C.2. Price 45s.

NOW BERRY'S INTRODUCE MAGIFLOW

The new
one-gallon
water heater



HERE IS MAGIFLOW—the latest newcomer to Berry's famous 'Magi' range of electrical appliances.

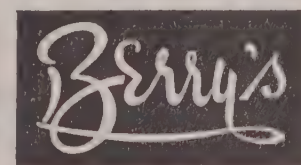
Trim good looks and top efficiency make the Magiflow the water heater more and more people are going to ask for. Its sleek design takes up less than a square foot of wall space—yet Magiflow can supply more than enough piping hot water for any average family, thanks to its exceptionally quick recovery.

First-class insulation and "magic eye" thermostatic control cut running costs to the absolute minimum. Check all the Magiflow's features and see why *this* is the water heater you should recommend.

Capacity: 1 gallon
Voltage: 200-250V
Loading: 2kW at 250V
1.5kW at 200V
Size: 17" high 7½" wide
8" projection
Finish: White or cream
Chromium fittings
Black, easy-to-clean,
toughened plastic tap

£10.16.6 plus P.T. £2.2.3

PRICE: £12.18.9



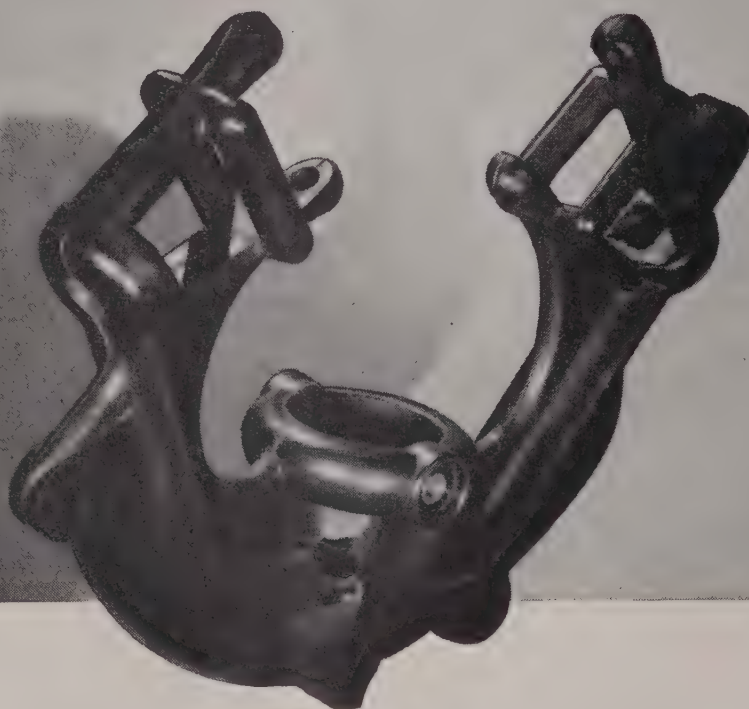
BERRY'S ELECTRIC MAGICOAL LTD

Water Heater Division • Touchbutton House • Newman Street • London • W.1

Tel: MUSEum 6800

ENGLISH ELECTRIC

**epoxy resin castings
for simpler, more compact,
more reliable components**



The use of epoxy resin castings offers the designer of electrical equipment many alternatives which often permit substantial improvements on earlier design and manufacture.

Excellent results have been obtained using this material for both large and small components for high and low voltage applications, from encapsulated small radio transformers to heavy current reactor coils. Castings are now being produced weighing from as little as a fraction of an ounce up to 4 cwts.

A specialist team of insulation and chemical engineers is available for consultation.

Send for Publication RC/101 describing the materials used, the process and the facilities available, to:

RESIN DEPARTMENT, KIDSGROVE, STOKE-ON-TRENT, STAFFS.

The English Electric Company Limited, English Electric House, Strand, London, W.C.2.

ELECTRICITY IN TRANSPORT

RAILWAY MODERNISATION A SOUND INVESTMENT

THE British Transport Commission in their annual report describe 1960 as a year of considerable achievement under the railway modernisation plan. It is not sufficiently understood, they point out, that the full benefits of modernisation are not realised until large areas of operation have been dealt with. They also add that, in their view, nothing has happened, either technically or as regards economics or timing, to falsify the various expectations put upon the modernisation plan; they stand by their statement in the re-appraisal that railway modernisation is a sound investment from the country's point of view. It is in their opinion too soon to judge whether the financial relief implied by this reorganisation will be sufficient to enable British Railways to meet all their financial obligations and to sustain the scale of services which the nation expects. On the other hand, the Commission remain convinced that British Railways should achieve an operating surplus within a few years.

Last year, in spite of increased receipts, the improved rates of pay raised the working deficit on British Railways to £67.7 million. The other undertakings had a working surplus of £31.4 million, "the best achieved to date," giving a combined working deficit of £36.3 million. After adding interest and other charges the overall deficit was £100.9 million and that of the railways alone £112.7 million.

Electronic Signal Interlocking

The report contains many examples which show the increasing use of electrical techniques on the railways. A prototype electronic signal interlocking equipment incorporating "fail safe" principles is being installed at Henley-on-Thames signal box this summer, and the plug-in logic units are expected to reduce long-term maintenance costs as well as the size of the installation. At Derby, a digital computer has been used in the analysis of the large quantities of measurements recorded directly on punched paper tape in the course of the a.c. electrification systems tests.

Within the new organisation for electric traction research, work has started on the study of the dynamic behaviour of overhead equipment; the behaviour of pantographs, using high-speed photography; the performance of insulators under contaminated conditions; the adhesion between wheel and rail; and the application of commutatorless motors and modern electronic developments to traction problems, in which the Electric Propulsion Panel set up by the Research Advisory Council have been concerned. The development of linear motors at the University of Manchester is thought to offer "stimulating prospects of a novel method of traction which may have potentialities in some fields of transport."

Plans are being prepared for the extension of electrification over certain of the non-electrified lines of the central section of the Southern Region and the system of traction to be adopted over the main lines to Weymouth and Salisbury is being considered. Good progress was main-

tained on the London, Tilbury and Southend electrification and at the end of the year 98 per cent of the overhead structures and about 66 per cent of the overhead line had been installed. Detailed planning for the electrification of the Great Northern suburban lines went on steadily during the year.

The dieselisation programme is nearing completion. It has taken about seven years. Out of a total of 1,791 diesel main-line locomotives which had been authorised, 837 had been delivered by the end of 1960 compared with 420 a year earlier.

Despite a serious shortage of signal engineers, it is expected that nearly 3,000 track miles will have been equipped with modern colour light signalling over the period 1959-63. Efforts to get agreement on standard and miniaturised components for these schemes were pursued. By the end of 1960, about 790 route miles of main line had been equipped with the automatic warning system of train control and some 3,307 locomotives and multiple-unit vehicles had been fitted. The whole of the main lines should be equipped by 1970.

To improve internal communications the Commission decided last year that British Railways needed a comprehensive trunk switching telephone system. Although the final cost of this "on demand" telephone system would be high, the regions were authorised to go ahead and plan their improved schemes so that these would be compatible with the master plan.

On the London Transport Underground lines, interlocking signal apparatus operated by programme machines controlled from a supervision room at Earls Court now controls the routing of all trains at Putney Bridge and Parsons Green on the District line. Because some of the movements in and out of sidings do not follow a set daily pattern, a siding allocation panel was devised and this is pre-set in accordance with local service requirements. The programme machines refer to the panel to determine the actual siding into which individual trains are to be routed and all the shunting movements are carried out automatically. Following the successful trial of the bus electronic scanning indicator, six more routes are to be equipped running through the centre of London.

Increased Revenue

The increase in receipts on some of the newly-electrified services is stated to have been most encouraging. In the first full year of operation of the electric trains between London, Sheerness, Ramsgate and Dover Marine, receipts in the area improved by about one-third.

Expenditure on electricity for traction purposes, both generated in the Commission's own stations and bought, increased by £300,000 to £14.5 million. The decline in generating expenses was more than offset by increases in the purchase of current and distribution expenses. Total consumption increased by nearly 50 million kWh to 1,737 million kWh and the cost per unit was again marginally lower at 1.742d.

Financial Section

STOCKS and SHARES

WITHIN a week or so the passing of the Finance Bill should give the Chancellor of the Exchequer his authority to use the "regulators" which he introduced into his Budget as a means for controlling personal and corporate expenditure. Uncertainty over his intentions in that respect is among the factors which have kept the industrial markets of the Stock Exchange very quiet at a level of prices some 12 per cent below the peaks recorded in mid-May. Their performance became a good deal steadier over the week, but signs of an effective rally were still wanting.

Quiet Markets

Prices of the leading electrical shares showed little quotable change over the week, although Crompton Parkinson and B.I.C.C. lost some of their recent improvements. Among the popular "growth" stocks, I.C.T. and Plessey again displayed considerable resiliency. Automatic Telephone recovered a little from the depression induced by the annual report, while Ultra Electric returned to favour and Head Wrightson responded to the encouraging tenor of the chairman's speech at the company's meeting. Marryat & Scott at 18s 6d and James Scott at 32s moved up to their best prices of the year after the announcement of the annual results. With improved earnings in each case, the former company is raising the dividend from 27½ to 32½ per cent, while James Scott are paying 27½ per cent, or 2½ points more than last year.

Allen West Issue

Allen West are raising rather more than half a million fresh capital by an issue of new 5s shares, which have been changing hands at a premium of about 9d on the price of 10s at which they are offered to shareholders. Much work on new building and improvements has been financed in recent years out of retained profits, and the new money is to be used to similar ends. When reviewing prospects at the annual meeting, the chairman shared the general concern over the trend of production costs, but told shareholders that the company had more work on hand than ever before. No firm forecast is made of this year's results, but it is expected that the dividend on the increased capital will be at least maintained at the

present rate of 13½ per cent. This indicates a yield of 6½ per cent on the new shares at an all-in price of 10s 9d.

Company News

Shareholders of Davis & Timmins have now received the formal offer to

exchange each share for two Delta Metal shares. Their directors recommend acceptance of the proposal which, on the information and estimates provided, would improve their income and give them an interest in a more broadly based enterprise. Delta have been

Price Changes in

Company or Board	Nom. Value	Middle price 3rd July	Week's Rise or Fall	Dividend		Yield %	1961	
				Pre- vious	Last		High- est	Low- est
Gilt-edged Stocks								
Brit. Elec. 1968/73	100	73½		3	3	£ s d 4 1 9	75½	73½
Brit. Elec. 1974/77	100	68½	—½	3	3	4 7 6	70½	68½
Brit. Elec. 1976/79	100	70	—½	3½	3½	5 0 0	73½	70
Brit. Elec. 1974/79	100	80		4½	4½	5 6 3	82	80
Brit. Elec. 1967/69	100	90	—½	4½	4½	5 0 0	91½	89½
Overseas Electric Supply								
Calcutta Elec.	£1	22/6		7†	7½†	10 18 0	23/3	20/6
East African Power	£1	13/-		8	10	15 7 9	15/-	13/-
Nigerian Elec.	£1	18/6	—6d	8	10	10 16 3	19/9	15/6
Perak Hydro-Elec.	£1	22/-		10	10	9 1 9	23/6	17/6
Electrical Shares								
Aberdare Holdings	5/-	15/9	—9d	17½	17½	5 11 0	17/-	14/3
Aerialite	1/-	4/6		54	54	12 0 0	8/-	4/6
Allen, W. H.	£1	36/3		14	10*	5 10 3	42/6	36/-
Allied Insulators	5/-	8/9	—3d	20	10*	5 14 3	10/-	8/9
Alwyn Holdings	5/-	32/6	+6d	—	12½	—	32/6	24/6
Anglo-Portuguese Tel.	£1	21/3	+6d	9	9	8 9 6	25/-	18/9
Arcoelectric	1/-	6/-		15	15	2 10 0	6/-	3/9
Aron Motors	£1	68/9		15	15	4 7 3	70/-	67/6
Assoc. Elec. Ind. Ord.	£1	40/-	—3d	15	15	7 10 0	48/6	39/6
Automatic Tel. & El.	5/-	13/9	+1/-	17	17	6 3 9	20/6	12/9
Babcock & Wilcox	£1	30/6		9	9	5 18 0	36/6	30/3
Bakelite	10/-	52/6	—2/6	17½	17½*	3 6 9	60/-	42/-
Baldwin, H. J.	2/-	1/9		10	Nil	—	1/9	1/6
Berry's Electric	5/-	47/6		30	30*†	3 3 3	52/6	37/-
Bowthorpe Holdings	2/-	8/6		18½	22	5 3 6	10/3	8/-
Brit. Elec. Resistance	2/-	7/6		17½	17½*†	4 13 3	8/9	6/6
Brit. Elec. Traction:								
Def. Ord. "A"	5/-	50/-	—1/6	40	50	5 0 0	57/6	41/9
Brit. Electronic Ind.	5/-	11/6		—	15½	6 10 6	15/3	11/6
B.I. Callender's	£1	59/-	—1/-	13½	13½	4 11 6	62/3	49/6
B.I. Callender's 6% Pref.	£1	17/-		6	6	6 15 3	18/3	17/6
British Thermostat	5/-	33/9		20	27½	4 1 6	40/-	28/-
Brook Motors	10/-	54/6		25	25*	4 11 9	55/-	47/-
Bulgin, A. F.	1/-	11/6	+3d	55	40*	3 9 6	12/3	7/9
Bulpitts	5/-	20/-	—1/-	15	16½	4 1 3	27/6	16/9
Burco Dean	5/-	7/6		18	15	10 0 0	11/9	7/6
Cable & Wireless	5/-	18/6		10	10*†	2 14 0	19/9	12/6
Cambridge Instruments	5/-	35/9		12½†	22	3 1 9	38/6	30/-
Chloride El. Storage "A"	£1	81/3		17½	20	4 18 6	91/-	72/-
Clarke Chapman	£1	46/3	—1/9	13½	13½	5 19 0	54/-	43/6
Clarke, T.	2/-	4/9		16	16	4 10 0*	5/3	3/6
Combined Elec. Mfrs.	4/-	7/9	—6d	—	12½†	6 9 0	10/-	7/6
Contactur Switchgear	5/-	13/3		14	14	5 5 9	16/-	13/3
Cossor, A. C.	5/-	5/9		Nil	Nil	—	8/-	5/6
Crabtree	10/-	26/6	+6d	20	12½*	4 14 3	33/9	26/-
Crompton Parkinson	5/-	12/6	—6d	14	12½*	5 0 0	14/6	11/3
Davis & Timmins	5/-	44/6	—6d	25	35*	—	49/6	30/3
De La Rue	10/-	57/6	—1/-	22½	22½*	3 18 3	70/-	55/-
Decca "A"	10/-	58/-	—1/6	20	23½	4 0 0	70/-	52/3
Desoutter	5/-	65/-		30	35	2 13 9	68/9	49 -
Dewhurst	2/-	12/-	—3d	20	20	3 6 9	13/-	7/6
Dictograph Tel.	2/-	12/-		20	20*	3 6 9	13/-	8/6
Dimplex	5/-	78/9		—	30	1 11 9*	79/-	47/-
Dubilier Condenser	1/-	2/9		25	30	5 9 0*	3/-	2/3
Duport	5/-	11/6		17½	20	5 16 0*	17/-	11/6
E.M.I.	10/-	40/9	—3d	20	17½*	4 6 0	51/3	41/-
Eleco	2/-	8/3		20	20	2 8 6*	10/6	4/3
Electrical Apparatus	5/-	19/-	+6d	14½	20	5 5 3	21/-	17/-
Electrical Components	5/-	8/9		15	11½*	6 11 6	9/9	8/9
Elec. Construction	£1	24/-		9	5	4 3 3	39/-	23/6
Elliott-Automation	5/-	33/3	—9d	9.3	13	1 19 3	37/6	25/6
Enfield Rolling Mills	£1	40/6	—6d	15	15	7 8 3	51/6	40/6

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

* After scrip issue.

† Free of income tax.

‡ Dividend indicated.

quoted recently around 23s and D. & T. at 44s 6d. Dewhurst & Partner 2s shares have been reactionary at around 12s since the announcements of a 100 per cent scrip issue and an increase in the interim dividend. The intention to make the issue in the form of a new

class of "A" non-voting shares has attracted comment.

Pyrotenax Results

Net profits of Pyrotenax for the year ended in March were little different from the previous figure at £429,000

(after tax) but in its Silver Jubilee year the company is adding a 5 per cent bonus to the unchanged 40 per cent rate of dividend and proposes a one-for-three scrip issue. The results were in line with expectations based on an interim report issued in January, when there was said to be a certainty of intensified competition in the field of mineral insulated cables, but the directors were satisfied that plans formed to increase the efficiency and scope of the business would be to the ultimate advantage of all members of the group. At 59s 6d, the 5s shares yield 3½ per cent on the total distribution of 45 per cent.

Alwyn Holdings

Very few industrials are left now to share the distinction of Alwyn Holdings in being quoted at their best price of the year. Support for the rise in the 5s shares to 32s 6d materialised in the announcement of a one-for-two scrip issue and of the company's expectation of a 15 per cent dividend on capital so increased. For 1959-60 there was a payment of 12½ per cent, but this was covered practically six times over by earnings, which have been distributed with the utmost conservatism while the balance of the cash paid for the Rashleigh Phipps business two years ago remained outstanding. It was the directors' intention to pay off the remaining £75,000 during the year ended in March, and thereafter to adopt the more liberal dividend policy which is now proposed. The rate forecast would produce a yield of 3½ per cent on the shares.

Drake & Gorham

The ordinary capital of Drake & Gorham was doubled towards the end of last year by a "rights" issue, and on the larger number of shares the company is maintaining the distribution at the rate of 17½ per cent to which it was raised (from 10 per cent) a year ago, although on this occasion 2½ per cent of the payment is described as bonus. An increase of almost one-third in the profit for 1960-61 provides a large surplus over the cost of the dividend. Having been firmly supported at around 12s 9d, the 5s shares offer a yield of over 6½ per cent on the dividend and bonus combined.

Ever Ready Chairman's Review

We regret that in last week's issue the statement on the progress of the Ever Ready Co. (Great Britain), Ltd., was wrongly attributed. It was, in fact, made by the present chairman, Mr. E. N. Rowbotham, in his annual review.

Electrical Investments

Company or Board	Nom. Value	Middle price 3rd July	Week's Rise or Fall	Dividend		Yield %	1961			
				Pre- vious	Last		High- est	Low- est		
Electrical Shares—continued						£	s	d		
English Electric ...	£1	34/-	-6d	10	10	5 17 9	40/9	32/-		
English Electric 3½% Pref. ...	£1	10/9		3½	3½	6 19 6	11/9	10/9		
Ericsson ...	5/-	25/-	-1/3	13½	13½	4 5 0	32/-	22/3		
Ever Ready ...	5/-	38/9	+1/9	20	22½	2 18 0	40/-	31/6		
Falk Stadelmann ...	£1	23/9		10	7½	6 6 3	26/-	21/9		
G.E.C. ...	£1	33/9	-6d	10	10	5 18 6	39/6	29/3		
G.E.C. 6½% Pref. ...	£1	17/-	-1/-	6½	6½	7 13 0	19/3	17/-		
General Cables ...	5/-	5/3		15	Nil	—	6/3	3/9		
G.H.P. Group ...	£1	24/6	+6d	6	7½	5 14 3	24/6	17/-		
Goblin (B.V.C.) ...	5/-	5/6		12½	10	9 1 9	8/6	5/6		
Hackbridge Holdings ...	5/-	5/3		20	20	9 10 6*	6/9	5/-		
Harland Engineering ...	5/-	14/9		16	16	5 8 6	19/-	14/9		
Head Wrightson ...	5/-	24/6	+6d	14	16	3 5 3	30/-	22/-		
Heatrae ...	2/-	14/-		12½	25	3 11 6	19/-	12/6		
Holophane ...	5/-	18/9		26	30	8 0 0	20/6	17/3		
Hoover ...	5/-	46/6	-1/9	90	45*	4 16 9	55/6	46/-		
Hunt, A. H. ...	4/-	21/9		20	20	3 13 6	25/9	18/-		
Intl. Combustion ...	5/-	26/9	+1/-	30	30	5 12 3	33/9	24/-		
Intl. Computers & T. ...	£1	95/-	+1/-	10	11½	2 7 3	107/-	59/-		
Johnson & Phillips ...	£1	22/-	-6d	Nil	5	4 11 0	24/-	17/6		
Kenwood Mfg. ...	1/-	4/9		—	—	—	6/-	5/-		
Laurence Scott ...	5/-	15/3	+6d	15	15	4 18 3	18/9	14/9		
Lister, R. A. ...	£1	47/6	-1/6	14	14	5 17 9	56/9	47/3		
Lucas, J. ...	£1	59/-	-1/-	12½	13½	4 13 3	71/6	59/-		
Marryat & Scott ...	2/-	18/6	+3d	27½	32½	3 10 3	18/6	13/9		
Mather & Platt ...	£1	41/3	-1/3	11	11	5 6 9	51/6	41/3		
Metal Industries ...	£1	59/6	-1/-	14	15	5 0 9	66/6	53/-		
Midland Elec. Mfg. ...	£1	66/3		12	12	3 12 6	67/6	58/6		
Murex ...	£1	43/9	-2/6	15	20	5 5 0*	51/6	39/3		
Newman Ind. ...	2/-	7/6		12½	15	4 0 0	7/6	5/-		
Oldham & Son ...	1/-	3/-		17½	17½*	5 10 0	3/-	2/3		
Parsons, C. A. ...	£1	57/6		9½	12½	4 7 0	72/6	46/9		
Philips' Lamps ...	Fl.10	225/-		16	16*	1 8 6	225/-	£10½		
Plessey ...	10/-	56/3	+6d	16	17½	3 0 6	60/-	46/6		
Pullin Group ...	2/-	13/-		25	25	3 17 0	15/-	11/3		
Pyrotenax ...	5/-	60/-	-1/-	40	45	3 15 0	65/-	46/6		
Radiation ...	£1	32/-		12	10	6 5 0	37/6	31/6		
Reliance-Clifton ...	5/-	28/-	-1/3	15	20	3 11 6	32/6	22/6		
Reyrolle ...	£1	44/6		17½	9½*	4 7 9	51/6	36/6		
Richardsons Westgarth ...	10/-	6/-		8½	Nil	—	8/3	5/9		
Sangamo Weston ...	10/-	20/6	-1/3	12½	13½	4 17 6*	25/9	19/9		
Scott, James ...	5/-	32/-	+6d	25	27½	4 6 0	32/-	25/6		
Simon Engineering ...	5/-	38/9		—	27½	3 11 0	43/9	28/-		
Smith (England), S. ...	4/-	17/6		17½	20	4 11 6	23/9	17/-		
Southern Areas ...	£1	21/-	-3d	5	6	5 13 0	23/-	14/6		
Strand Elec. ...	5/-	17/9	-9d	14-6	20½	5 12 9	20/-	12/3		
Sturtevant ...	5/-	11/6	-6d	15½	13½	9 6 0	18/6	11/6		
Sun Elec. ...	5/-	16/3		15	18½	5 13 9	17/6	16/3		
T.C.C. ...	10/-	43/9		35	22½*	5 2 9	43/9	40/-		
Telephone Rentals ...	5/-	32/-	-1/3	15	15	2 7 0	35/3	21/9		
Thompson (John) ...	5/-	14/9	-3d	20	5	1 14 0	16/9	14/-		
Thorn Elec. ...	5/-	53/3	-1/3	20	25	2 7 0	63/-	44/6		
Thornycroft ...	£1	25/-	-1/-	6	6	—	34/9	25/9		
Tube Investments...	£1	70/6	+6d	—	14	3 19 6	85/-	70/-		
Ultra Electric ...	5/-	27/6	+2/6	20	25	—	31/3	12/6		
Walsall Conduits ...	4/-	11/6		15	15	5 4 3	15/-	10/9		
Ward & Goldstone ...	5/-	30/-	-1/-	35	17½*	2 18 6	36/6	25/6		
Watford ...	2/-	7/6	-3d	25	20*	5 6 9	10/9	7/6		
Westinghouse ...	£1	39/-	-1/9	11	11	5 12 9	45/-	36/-		
West, Allen ...	5/-	10/9		12½	13½	6 5 6	14/6	10/9		
Wilkins & Mitchell ...	5/-	10/3	-1/-	17	21*	—	15/3	10/3		
Wolf Electric ...	5/-	15/3	-9d	12½	13½	4 10 3	17/6	14/-		

REPORTS and DIVIDENDS

Pyrotenax, Ltd., is raising its distribution with a 5 per cent bonus for the year to 31st March, 1961, and also announces a one-for-three scrip issue proposal.

Consolidated income, before tax, improved from £856,849 to £871,434. This increase was offset by heavier tax charges, leaving the net balance at £428,506, compared with £430,894.

The bonus payment, together with an unchanged final dividend of 25 per cent, makes a total of 45 per cent for 1960-61, against the previous dividend total of 40 per cent.

The proposed scrip issue, which is on the basis of one ordinary or "A" ordinary share for each 15s of such capital held, will be submitted at a meeting to be called for 28th September. It is proposed to increase the authorised capital by £1 million at a meeting to be held on 26th July.

In the absence of further Government restrictive policies the company looks forward to an expansion of its activities at home and abroad, says the chairman, Mr. L. W. Robson.

The group's manufacturing facilities are now fully employed and its order books stand at a record level. The company is now reaping the reward of the "courageous steps" taken some four years ago to rehouse and centralise most of its manufacturing processes.

Reliance Clifton Cables, Ltd.—Sir Robert Renwick, chairman, told shareholders at the annual meeting last week that, as a result of the "disastrous" price war that followed the break-up of the trade association in April, 1959, prices for about a quarter of the company's production had by early 1960 become uneconomic.

It was decided to forgo business of this kind, temporarily, which would have tied up resources on long-term contracts unprofitably, and to concentrate on extending production of telephone, high-quality and special-purpose cables. This led, in the last few months of 1960, to a level of activity that strained resources to near breaking-point and resulted in a 15 per cent increase in profit.

Rolls-Electromatic.—The board of Rolls Razor, Ltd., announces that the manufacture and sale of Rolls-Electromatic washing machines is proceeding satisfactorily at the Cricklewood factory. It has been agreed between the parties that the option by Rolls Razor, Ltd., to purchase the Electromatic Washing Machine Co., Ltd., which was to have expired at 30th June last is being extended pending

the finalisation of the accounts of both companies for the year ended 31st December, 1960, and for the first four months of 1961.

Parkinson Cowan, Ltd.—Group profit, after tax, fell from £281,184 for the 1959 year to £47,648 for the 15 months ended 31st March, 1961.

A final dividend of 6½ per cent makes 11½ per cent for the period, compared with the 17½ per cent total distribution, including 2½ per cent bonus, paid for the previous year.

The serious decline in profits is wholly attributed to the severe change in fortune suffered by the domestic appliance division which made a record profit in 1959 and a loss in 1960-61. Prospects for the domestic appliance operations in the current year are described as uncertain. The company is engaged in negotiations to widen the base of its operation in the industrial heating field to make it less dependent upon the appliance business.

Marryat & Scott Holdings, Ltd.—A five-point rise in the dividend to 32½ per cent is being made for the year ended 31st March. Group profit rose from £106,795 to £133,033, after tax of £123,687 (£107,327).

Drake & Gorham, Ltd., reports group profits, before tax, up from £129,476 to £171,154 for the year to 31st March, 1961, and is paying a 15 per cent dividend plus a 2½ per cent bonus on capital doubled by last November's rights issue. For 1959-60 there was a 17½ per cent dividend payment on the old capital.

James Scott (Electrical Holdings), Ltd.—The final dividend is being raised to 22½ per cent, making 27½ per cent for the year ended 31st January last (against 25 per cent for 1959-60). Group trading profits rose from £376,806 to £404,459.

New Companies

International Systems Control, Ltd.—Registered 26th June. Capital £430,000. Manufacturers of and dealers in machinery and equipment of all kinds. Regd. office: Magnet House, Kingsway, W.C.2.

Marconi Instruments (Overseas), Ltd.—Registered 23rd June. Capital £100. To carry on the business of manufacturing and dealing in measuring instruments of all kinds, etc. Solicitors: Coward, Chance & Co., St. Swithin's House, Walbrook, E.C.4.

Glogal Electronic Machinery Co., Ltd.—Registered 22nd June. Capital £1,000. Manufacturers of and dealers in electronic instruments, etc. Directors: S. J. Cordell, A. E. List and G. Pollock. Regd. office: 31/32, Haymarket, S.W.1.

Micol Electro Engineering, Ltd.—Registered 22nd June. Capital £500. Manufac-

turers of and dealers in electrical and mechanical apparatus, etc. Directors: A. S. Colman, G. K. Miller, H. Young and David Woolfe. Secretary: Pauline E. Miller. Regd. office: 223, Edgware Road, N.W.9.

R. & R. Research, Ltd.—Registered 22nd June. Capital £10,000. To carry on the business of electrical, electronic, mechanical and general engineers, to carry out research in the fields of electricity and electronics, etc. Directors: T. M. C. Lance (chief engineer of Rank Cintel, Ltd.), R. J. Milwidsky, J. E. Piper (director Rank Relay Services, Ltd., etc.), M. Exwood (managing director Rediffusion Vision, Ltd.), R. R. Gabriel (technical director Central Rediffusion Services, Ltd.) and R. I. Kinross (managing director Rediffusion Research, Ltd., and director Television Research, Ltd.). Secretary: D. A. Smith. Solicitors: Sydney Morse & Co., E.C.1.

Brewster Precision Instruments, Ltd.—Registered 12th June. Capital £5,000. Designers and manufacturers of and dealers in electrical instruments, electronic appliances, scientific apparatus, heating and lighting appliances and accessories, etc. Directors: S. Brewster (managing director), Mrs. Florence M. Brewster (secretary), E. Klein and Mrs. Patricia M. Klein. Regd. office: "Doone," London Road, Camberley, Surrey.

Euk Catering Machinery, Ltd.—Registered 16th June. Capital £100. Manufacturers of catering equipment, etc. Subscribers: N. W. Middleton, 5, St. Gabriel's Avenue, Sunderland and H. Middlemiss, 36, Dunbar Street, Sunderland. So long as Moorwood-Vulcan, Ltd., is the holding company it may nominate and remove directors.

M. Jacobs (Electric), Ltd.—Registered 9th May. Capital £100. Manufacturers of and dealers in radio, electrical and mechanical apparatus, etc. M. Jacobs is the first director. Secretary: W. F. Bunn. Regd. office: 61, Brushfield Street, E.1.

Pascoe Electronic Products, Ltd.—Registered 9th May. Capital £100. Manufacturers of and dealers in electronic, mechanical, electro-mechanical equipment, etc. Directors: R. J. Pascoe and Vera Pascoe (secretary). Regd. office: Raymond House, 39, Harders Road, S.E.15.

Neville's Electrical Installations, Ltd.—Registered 25th May. Capital £500. Electrical engineers and contractors, electricians, electronics, radio and television engineers, etc. Directors: P. Neville, G. P. Neville and Mrs. Ethel Neville. Secretary: Edith Raine. Regd. office: 8, George Road, Edgbaston, Birmingham, 15.

S. B. Kirkby, Ltd.—Registered 9th May. Capital £100. Electrical engineers, etc. Secretary: S. H. Lucas. Regd. office: 6, Surrey Street, W.C.2.

Liquidations

W. H. Whalley, Ltd., electrical engineers, Marles Street, Burnley.—Winding up voluntarily. Liquidator, Mr. Smith Scoble, 4, Rosewood Avenue, Burnley, appointed by members on 14th June.

Electric Installation Co. (Wimbledon), Ltd., 11, Belgrave Road, London, S.W.1.—Winding up voluntarily. Liquidator, Mr. S. E. A. Pitman, 38, South Street, London, W.1, appointed by the company on 23rd June.

Stem (Elec.), Ltd., 72, Boundary Road, Hove, retailers of television, radio and electrical goods.—Liquidator, Mr. J. S. B. Hole, 7, Old Steine, Brighton, 1, Sussex, appointed 8th June with a committee of inspection.

Austin Fenwick, Ltd., 56-64, Bucknall Old Road, Hanley, Stoke-on-Trent, dealers in electrical apparatus.—Liquidator, Mr. P. J. Snow, 17, Albion Street, Hanley, Stoke-on-Trent, appointed 9th June with a committee of inspection.

Bankruptcy

F. G. Vincent, radio, television and electrical dealer, carrying on business at Wellsley House, High Street, Westham, Pevensy, Sussex.—Receiving order made 21st June on a debtor's petition.



● MODERN

● COMPETITIVE

● ENDURING

H.V. SWITCHGEAR

of quality



TYPE 'AC' Switchboard 11KV 350 MVA
incorporating motor charged spring
closing breakers supplied to DURGAPUR
INDIA

- Type AC AIR INSULATED
- Type FC COMPOUND-FILLED
- Type DFC DUPLICATE BUSBAR
- Type TFC Non Extensible RING MAIN
- Hand, Spring or Solenoid Closing
- ASTA Certificated to BS 116-1952

Cert. No. 4045 up to 800 amps 150 MVA at 6.6 kV

.. 4044	.. 1100	.. 250 MVA	.. 11.0 kV
.. 3764	.. 800	.. 250 MVA	.. 6.6 kV
.. 3765	.. 1100	.. 350 MVA	.. 11.0 kV
.. 3917	.. 1600	.. 250 MVA	.. 6.6 kV
.. 3926	.. 1600	.. 350 MVA	.. 11.0 kV

- Complies with BEBS. S2.
- Impulse Tested

J. G. STATTER & CO. LTD.

Telephone: LITTLE CHALFONT 2671/6

AMERSHAM COMMON, BUCKS,

Telegrams: STATTER AMERSHAM

A MEMBER OF THE



METAL INDUSTRIES GROUP

As you would expect...

Main propulsion motors—A.E.I. Ltd., Heavy Plant Division:

Cable & warping capstan motors, store & baggage hoist motors
and cargo winch motors—Clarke, Chapman & Co., Ltd.

Automatic helmsman motor—Lancashire Dynamo & Crypto Ltd. & S. G. Brown Ltd.

Carron cargo transporter motor—Bruce Peebles & Co., Ltd & The Carron Company:

Power cables—A.E.I. Ltd., Cables Division:

Auto-transformer starters—The General Electric Co., Ltd:

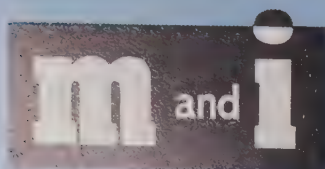
Billge pump motors—W. H. Allen Sons & Co., Ltd:

and other electrical equipment in the "CANBERRA"

... all incorporate insulation by M & I



*This illustration is reproduced by courtesy of
The P & O—Orient Lines and Harland & Wolff Ltd.*



THE ELECTRICAL INSULATION PEOPLE

THE MICANITE & INSULATORS CO., LTD., Empire Works, Blackhorse Lane, Walthamstow, London, E17



Telephone: Larkwood 5500. Telegrams: Mytilite London Telex. Telex: 25183



The new Texas Instruments semiconductor component plant at Bedford

New Semiconductor Factory

THE new plant of Texas Instruments, Ltd., at Bedford, was officially opened last week by Sir John Cockcroft, Master-designate of Churchill College, Cambridge. It consists of a three-storey office block with a two-storey manufacturing area of 132,000 sq ft. The main building is designed for the manufacture of transistors and other semiconductor components and consequently an elaborate air-conditioning system has been installed. An interesting feature of the factory is the use of hyperbolic paraboloid roof shells.

In his opening remarks, Sir John Cockcroft referred to the application of transistors to computers which was making possible much higher speeds, greater reliability and less power consumption so that the major universities, such as Cambridge, were looking to increasing their computing power by several orders of magnitude. Sir John hoped that with the rapid development now proceeding, costs could be so much reduced that computers could be available to many universities five to ten years from now.

The development of silicon transistors had been of great importance in allowing higher temperature operation, and Sir John referred to the Texas Instrument Co.'s contributions to this work. In particular, he spoke of the recent development of an ultra-fast silicon transistor which would perform switching operations in 24 millimicrosec. This, he said, should be of great importance in computer development. The average cost of transistors in the U.S. had been reduced from tens of dollars to about \$2 during the last ten years.

Semiconducting solid circuits could now be made to perform the function of a complete circuit incorporating resistors, capacitors, etc.; this had allowed the miniaturisation of circuits to be carried

one or two orders of magnitude further down the scale.

In the United States, the industrial output of semiconductor devices was valued at \$500 million in 1960 with a doubling time of two years, and Sir John hoped that the new factory at Bedford would help to increase the U.K. output and shorten the present British doubling time. Some of the future plans of the Texas Instruments organisation in which Sir John was interested included the possibility of transistors being made from organic materials and the commercial possibilities of refrigeration using the reverse Peltier effect.

In cutting a ribbon to symbolise the opening of the new factory, Sir John utilised the most modern technology. Solar energy falling on a photo-sensitive element coupled to one of the newly-developed solid state semiconductor circuits provided a current amplified by a two-stage silicon transistor. This in turn triggered a



General view of the air-conditioned semiconductor components assembly area

silicon-controlled rectifier in the primary circuit of a transformer, which then produced 15 kV creating the spark which broke the ribbon.

Following the opening ceremony, Mr. P. E. Haggerty, president of Texas Instruments, Inc., read a letter which he was about to send to Sir John. In this letter he said that companies such as Texas Instruments had a vital interest in the success of the new Churchill College at Cambridge. The letter concluded: "It gives me great pleasure, therefore, to be able to say that Texas Instruments, Ltd., will enter into a seven-year covenant with Churchill College of Cambridge University pledging £750 annually for that period as a modest expression of our respect for the challenge you face, and in this way at least aid you in meeting it."

ELECTRICAL EXPANSION IN EIRE

THE Electricity Supply Board of Ireland has announced plans for a considerable expansion of plant capacity during the next five years. Last year the Board's stations generated 2,292 million kWh. Two new peat-burning stations are now almost completed and will soon be in service, but the country's demand for electricity is growing so rapidly that further extension has become necessary.

Before 1925 there were something like 300 small local suppliers of electricity in Irish cities and towns but no effort had been made to supply electricity on a national basis. In 1925, following a survey of the River Shannon a German contracting firm began work on the building of the Ardnacrusha hydro-electric station near Limerick. This single station's annual output of 150 million kWh then seemed to be more than even the whole of that part of Ireland (the twenty-six counties that were then called the Irish Free State) would need, but within three years the demand for electricity had so grown that Ardnacrusha was working to full capacity.

The present Electricity Supply Board is a State-sponsored enterprise which enjoys a good deal of autonomy. Members of the Board are appointed by the Government and the Board submits an annual report to the Minister for Transport and Power.

As demand increased a coal-burning station at the Pigeon House, Dublin, was reconstructed in the early 1930's, and in 1937 work was started on a hydro-electric station on the River Liffey. Development was interrupted during the war but the building of new power stations began again in 1946. About the same time a scheme for complete rural electrification was started and villages and farms in some of the most remote districts were connected with the expanding national grid.

The first power station to use peat from Irish boglands was built at Portarlinton, in the Irish Midlands, in 1948, and within the next ten years eight other stations, capable of using sod or milled peat, were built in many parts of the country.

The Board at present has 22 generating stations of which 13 burn oil, coal or Irish peat. The others are hydro-electric stations on the rivers Shannon, Lee, Erne, Liffey and Clady. The total potential output from Irish rivers has been estimated at 900 million kWh annually and the E.S.B. estimates that its stations are already utilising 75 per cent of this available water power.

Since there is little room for expansion in the use of Ireland's water power the Board believes that further expansion must be on the basis of stations burning coal, oil and peat. The largest item in the Board's plans for the next five years is the building of two 60,000 kW generating units burning coal and oil at Ringsend in Dublin. When these extensions have been made Ringsend will be the largest station in the country, capable of generating 800 million kWh a year.

The capacity of the Marino station, Cork, which also uses coal or oil, will be doubled by the addition of one 60,000 kW unit. This station at present has two 30,000 kW generators. The milled peat station at Ferbane, in County Offaly, is to have an additional 30,000 kW unit and the capacity of the Rhode Island station, also in County Offaly, is to be doubled to 80,000 kW. Additional units are also to be built at the Portarlinton station in County Dublin, which burns peat, and at the oil-burning station at the North Wall in Dublin City.

Reducing Atmospheric Pollution

THE Clean Air Year Book, 1961, which is published at 2s 6d by the National Society for Clean Air (Field House, Breams Buildings, London, E.C.4.), records the progress made last year towards achieving the objects of the Clean Air Act which came into force on 1st December, 1956. It summarises the Act and the Regulations made under the Act and includes numerous tables and other relevant statistics.

A new feature is a table of local authorities in "black areas" showing the progress already made by each in setting up smoke control areas, their eventual targets and the scheduled dates for fulfilment. Pollution emitted into the air annually is estimated to be a million tons of domestic smoke compared with half a million from industry, railways and other sources. The publication includes short articles on the work of related organisations in the U.K. and overseas with directories and lists of recent papers and other documents on the same subject.

Semiconductor Device Symbols

International work on the standardisation of letter symbols for semiconductors, sponsored by the International Electrotechnical Commission, is well advanced but has not reached the publication stage. However, the international agreements to date have been taken into account and largely incorporated in the new British Standard, B.S. 3363:1961 "Letter Symbols for Light-Current Semiconductor Devices." This is primarily intended as an aid to manufacturers and users of semiconductor devices. It should also, however, be found useful for most technical literature concerned with the characteristics or behaviour of light-current semiconductor devices.

Copies may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 5s each.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2

1956

34445. Ferranti, Ltd.—Electron beam discharge tubes. 7th February, 1958. (872170.)
37287. Plessey Co., Ltd.—Moulded resistors and electrical switches and contacts therefor. 21st November, 1957. (871995.)
39155. Automatic Telephone & Electric Co., Ltd.—Subscribers' line circuits for automatic telephone systems. 27th November, 1957. (871956.)

1957

2040. Electric & Musical Industries, Ltd.—Inductances suitable for use in electrical circuits having conductors adhering to insulating supports. 14th January, 1958. (Cognate application 8223, 13th March, 1957.) (872050.)
30066. Sale, B.—Plug and socket electrical connector. 24th September, 1958. (872171.)
30190. Philips Electrical Industries, Ltd.—Photo-conductive bodies and method of manufacturing these bodies. 26th September, 1957. (872100.)
35080. Siemens-Schuckertwerke A.G.—Electric circuits employing elements which operate by virtue of the Hall effect. 11th November, 1957. (871867.)
35728. International Business Machines Corporation.—Transistor switching circuits. 15th November, 1957. (872251.)
38965. Automatic Telephone & Cables, Co., Ltd.—Automatic or semi-automatic telephone systems. 17th November, 1958. (872301.)
40380. Standard Telephones & Cables, Ltd. (Compagnie Générale de Constructions Téléphoniques S.A., and Matériel Téléphonique S.A.).—Concentrators of telephone lines or the like. 31st December, 1957. (872059.)

1958

19707. Licentia Patent-Verwaltungs-G.m.b.H.—Controllers for devices consuming electrical energy. 19th June, 1958. (871600.)
21322. Pirelli S.p.A.—Sealing end for entry into a transformer or like casing of a single-core high voltage electric cable. 3rd July, 1958. (871436.)
22021. United Kingdom Atomic Energy Authority.—Shielding of radioactive liquid masses. 17th June, 1959. (871665.)
22397. Associated Electrical Industries, Ltd., and Postmaster General.—Communication systems. 16th June, 1959. (871583.)
22499. Brown, Boveri & Cie. A.G.—Vacuum-tight electrode lead-in assembly for mercury vapour rectifiers, having an insulator arranged around a lead-in pin. 14th July, 1958. (871603.)
22626. Pye, Ltd.—Induction coupling devices. 29th June, 1959. (Cognate application 26633, 19th August, 1958.) (871437.)
23599. Gowland, D. J.—Electrical control systems. 20th October, 1959. (871696.)
23833. Jet Line Gun Co., Inc.—Method and apparatus for inserting wires or other pliable lines in conduits. 24th July, 1958. (871681.)
24514. Simmonds & Stokes (Niphan), Ltd.—Glands for electric cables. 9th July, 1959. (871697.)
24747. Sherritt Gordon Mines, Ltd.—Process for recovering noble metals from refractory minerals. 31st July, 1958. (871646.)
24963. General Electric Co., Ltd.—Methods of manufacture of waveguide structures. 20th July, 1959. (871382.)
24964. General Electric Co., Ltd.—Radio direction finding systems. 27th July, 1959. (871383.)
24991. Cole, Ltd., E. K., and Thompson,

W. E.—Electronic pulse amplitude analysing apparatus. 4th August, 1959. (871655.)

25632. General Electric Co., Ltd.—Methods of manufacturing waveguide structures. 20th July, 1959. (871384.)

25676. Fuller Electric, Ltd.—Electric regulator control systems. 31st July, 1959. (871759.)

26530. Associated Electrical Industries, Ltd.—Oscillator circuits. 18th August, 1959. (871310.)

28885. Union des Verreries Mécaniques Belges S.A.—Process for the production of electrically conductive coatings and products obtained by this process. 9th September, 1958. (871311.)

29732. Fuller Electric, Ltd.—Electrical regulator control systems. 6th August, 1959. (871760.)

33179. Allis-Chalmers Manufacturing Co.—Telescoping fuel element assembly for a nuclear reactor and operating means. 17th October, 1958. (871746.)

33369. United States Atomic Energy Commission.—Purification of nuclear reactor fuels. 20th October, 1958. (871314.)

34340. Associated Electrical Industries, Ltd.—Sealing of cathode-ray tubes, thermionic valves and the like. 30th September, 1959. (Cognate application 25340, 23rd July, 1959.) (871594.)

34602. Automatic Telephone & Electric Co., Ltd.—Direct call telephone systems. 7th October, 1959. (871554.)

36058. Catalytors, Ltd.—Catalytic devices for electric accumulators. 10th February, 1960. (871605.)

41721. Coq N.V.—Gas-blast circuit-breakers. 24th December, 1958. (871701.)

1959

2909. United Kingdom Atomic Energy Authority.—Nuclear reactors. 19th January, 1960. (871726.)

4061. Standard Telephones & Cables, Ltd.—Carrier current communication systems incorporating repeaters. 29th January, 1960. (871356.)

4074. Maschinenfabrik Augsburg-Nürnberg A.G.—Apparatus for the electrical measurement of periodically varying test forces used in the testing of materials. 5th February, 1959. (871607.)

4258. Telefunken G.m.b.H.—Method of producing magnetic storage matrices or switching matrices. 6th February, 1959. (871796.)

7203. Associated Electrical Industries, Ltd.—Rectifying circuits, particularly for metering arrangements. 16th February, 1960. (871729.)

14745. Commissariat à l'Énergie Atomique.—Linear ion accelerators. 30th April, 1959. (871415.)

14901. Chloride Batteries, Ltd.—Electric storage battery plates. 5th April, 1960. (871348.)

16704. Kabushiki Kaisha Meidensha.—Self-excited compound alternator. 15th May, 1959. (871631.)

27877. Collins Radio Co.—Means for measuring rate of change of frequency. 4th August, 1959. (871773.)

28498. United States Secretary of the Army.—Contacts on semi-conductor devices and methods of making such contacts. 20th August, 1959. (871271.)

28641. Commissariat à l'Énergie Atomique.—Variable step interferometers. 21st August, 1959. (871640.)

30842. Foxboro Co.—Transducing apparatus. 9th September, 1959. (871669.)

31152. Simplex Electric Co., Ltd.—Hot-plate units and cooking stoves incorporating such units. 9th June, 1958. (Divided out of 871371.) (871372.)

36175. Forges et Ateliers de Constructions Electriques de Jeumont.—Control of rectified current electric locomotives. 26th October, 1959. (871306.)

36538. Clevite Corporation.—Transistor with double collector. 28th October, 1959. (871307.)

40320. Union Carbide Corporation.—Electrochemical diode rectifiers. 27th November, 1959. (871675.)

41566. Moffats, Ltd.—Electrical heater units. 7th December, 1959. (871734.)

42337. SWF-Spezialfabrik für Autozubehör G. Rau G.m.b.H.—Method of stripping the insulation from the ends of varnished wire windings. 12th December, 1959. (871677.)

1960

39011. Pye, Ltd.—Induction coupling devices. 29th June, 1959. (Divided out of 971437.) (871438.)

5523. Metallgesellschaft A.G.—Collecting electrodes for electrostatic precipitators. 16th February, 1960. (871282.)

7007. Bush & Rank Cintel, Ltd.—Scan generator circuits. 29th February, 1960. (871559.)

10652. Fernseh G.m.b.H.—Focus correcting arrangements for electron beams. 25th March, 1960. (871560.)

13216. Landis & Gyr A.G.—Magnetic amplifiers. 13th April, 1960. (871707.)

14112. Kinsbourg, R. P. L.—Dish-washing machines. 22nd April, 1960. (871708.)

35152, 35575, 35577/8 and 35856. Steg-hart, F. L. F.—Automatic electronic controllers. 22nd February, 1957. (Divided out of 871562.) (871563/7.)

1961

6024. Reeves Instrument Corporation.—Quadrature switching apparatus. 10th September, 1957. (Divided out of 871618.) (871619.)

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 243a, Dorset House, Stamford Street, London, S.E.1, to ascertain that dates for their functions do not clash with others already arranged

MONDAY, 10th JULY

London.—White Hall Hotel, Bloomsbury Square, W.C.1, 7.15 p.m. A.S.E.E. Central London Branch. "Modern Motors and their Control."

TUESDAY, 11th JULY

London.—Connaught Rooms, W.C.2, 12.30 for 1 p.m. Electrical Industries Club. Ladies' luncheon. Speaker, Christopher Mayhew, M.P.

WEDNESDAY, 12th JULY

Luton.—Luton College of Technology, Park Square, 8.15 p.m. A.S.E.E. Luton Branch. "Colour Television," by P. S. Carnt.

THURSDAY, 13th JULY

London.—Prince of Wales Hotel, S.W.19, 7.45 p.m. A.S.E.E. South West London Branch. "Electric Motor Control Gear," by R. F. Mathieson.

Food and Cookery Centre, 39, Queen's Street, E.C.4, 2.15 p.m. Electrical Association for Women, London Branch. Visit.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Brazil.—State Electric Energy Commission. Rio Passo Fundo hydro-electric project. Closing date for tenders postponed to 4th December. (E.S.B. 5537/61.)*

Burma.—Government Purchase Board. 17th July. Electric light fittings. (E.S.B. 21073/61.)* 20th July. Electric motors. (E.S.B. 21323/61.)* Batteries. (E.S.B. 21324/61.)*

Cambridge.—City Council. 1st September. Electric lamps for one year from 1st October. City engineer and surveyor, The Guildhall.

France.—Purchasing and Contracting Officer, A.F.C.E. Headquarters. 31st July. Diesel-driven generators. (E.S.B. 20831/61.)* Cables. (E.S.B. 20991/61.)*

Greece.—Government Social Insurance Headquarters. 27th July. Refrigerators. (E.S.B. 21055/61.)*

Ilford.—Corporation. 25th July. Removal of trolley-bus poles. (See Classified Advertisement Section.)

India.—Heavy Electricals, Ltd. 8th August. Electrical manufacturing equipment. Tender forms obtainable from Shri D. P. Guzdar, Officer on Special Duty, Heavy Electricals, Ltd., Crown House, Aldwych, London, W.C.2; last date for purchasing forms 8th July. (E.S.B. 20946/61.)*

Madras State Electricity Board. 17th July. L.v. underground cables. (E.S.B. 20909/61.)* Atomic Energy Establishment, Trombay. 20th July. Dynamic analyser. (E.S.B. 20982/61.)*

Director General of Posts and Telegraphs. 24th July. Coaxial line equipment for trunk cable. (E.S.B. 20821/61.)*

Director General of Supplies and Disposals. 18th August. Cables and accessories. (E.S.B. 21024/61.)*

Iraq.—Ministry of Municipalities. 22nd July. Time switches. (E.S.B. 21017/61.)* Meters. (E.S.B. 21019/61.)* Transformers. (E.S.B. 21018/61.)* 29th July. Copper conductors. (E.S.B. 20954/61.)*

Directorate of Contracts and Purchases. 9th August. Dry batteries. (E.S.B. 21014/61.)*

Italy.—N.A.T.O. Infrastructure Contract. 12th September. 300 lighting fittings for airfield. Notification of wish to tender by 20th July. (G.D. 84/61 (130).)*

Luton.—Borough Council. 17th July. Erection and wiring of 720 Class "B" concrete lighting columns. (See Classified Advertisement Section.)

Malaya.—Central Electricity Board. 4th September. 132 kV cables. (E.S.B. 20908/61.)*

Newbury.—Borough Council. 27th July. Group "B" street lighting scheme. (See Classified Advertisement Section.)

New Zealand.—Wellington City Council. 25th July. Switchgear. (E.S.B. 21036/61.)*

Northern Ireland.—Larne Borough Council. 26th July. Group "A" fluorescent street lighting, Antiville Road. Borough Surveyor, 8, Victoria Road.

Housing Trust. 28th July. Electrical installation in three-storey block at Russell

Drive, Lurgan. Northern Ireland Housing Trust, 12, Hope Street, Belfast.

Tandragee R.D.C. 19th July. Electrical installations in 14 houses at Ballylisk, Tandragee. Engineer and Surveyor, Tandragee R.D.C., Town Hall, Banbridge, Co. Down.

Pakistan.—Malik Brothers, Ltd. 13th July. Switchgear components. (E.S.B. 21034/61/ I.C.A.)*

Rhodesia and Nyasaland.—Federal Tender Board. 28th July. Electric lamps. (E.S.B. 20996/61.)*

South Vietnam.—Central Purchasing Authority. 28th July. Automatic telegraphy equipment. (E.S.B. 20906/61.)*

Staffordshire.—County Council. 29th July. Electrical machinery for College of Technology. Director of education (supplies), County Education Offices, Earl Street, Stafford.

Thailand.—Provincial Electricity Authority. 14th July. Electricity meters. (E.S.B. 20990/61.)*

United States.—Public Utility District No. 1, Clallam County, Port Angeles, Washington. 10/14 MVA, three-phase transformer. (E.S.B. 21021/61.)*

Wortley.—R.D.C. 9th August. Street lighting installation. Arthur Wikeley, engineer, Council Offices, Grenoside, Sheffield.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Andover.—Factory unit, next to disused railway station, Longparish; Kennedy & Kempe, Ltd., Longparish.

Fire station, London Street; county architect, Guildhall, Winchester.

Ashington.—Maternity unit, midwives' training school and nurses' home at Ashington Hospital; Newcastle Hospital Board, Benfield Road, Newcastle-on-Tyne.

Ashton-in-Makerfield.—Houses (110), Low Bank Road estate; Frank Dean, clerk, Town Hall.

Bewdley.—Houses (101), Springhill estate; Pemberton & Bateman, architects, 21, Vine Street, Evesham.

Birmingham.—Large extension for Lewis's departmental stores; G. de C. Fraser, architect, 27, Dale Street, Liverpool, 2.

Bradford.—Halls of residence for Institute of Technology; city architect.

Bristol.—Museum and art gallery, Wine Street; planning officer, Cabot House, Deanery Road, 1.

Bury St. Edmunds.—Works and offices; Barber-Greene, Olding & Co., Ltd., Hatfield, Herts.

Chester.—Maternity unit at City Hospital; Liverpool Regional Hospital Board, 55, Castle Street, Liverpool.

Connah's Quay.—Office block; J. G. L. Poulson, architect, 29, Ropergate, Pontefract.

Cromer.—Secondary modern school; chief education officer, Stracey Road, Norwich.

Dudley.—Shops (38), Fisher Street and Castle Street redevelopment; borough architect, Ednam Road.

Dunstable.—Assembly hall, West Street; Shingler & Risdon, architects, 47, Bedford Row, W.C.1.

Edinburgh.—James Gillespie's High School for Girls (£360,000); J. D. Gibson & Simpson, quantity surveyors, 3, Melville Crescent.

Grimsby.—Fire brigade headquarters, Peaks Lane (£103,500); borough engineer.

Guildford.—Departmental store, Millbrook Relief Road site; Debenhams, Ltd., High Street, Guildford.

Holywell (Flints).—Houses for miners (75); surveyor, Rural Council Offices.

Kidlington.—Fire Brigade headquarters (£122,000); county architect, Park End Street Offices, Oxford.

King's Lynn.—Flats (40) and 16 maisonnettes, Gaywood Park; housing architect, Clifton House, Queen Street.

Leeds.—Shopping arcade and offices, Empire Theatre site, Briggate; D. B. Coombe, architect for scheme, 10, Lodge Hill Road, Lower Bourne, Farnham.

Leicester.—Redevelopment of Opera House site with 22 shops and café in arcade; Locker's Estates, Ltd.

London.—Houses and flats (51), Fernlea Road, Wandsworth; Michael Lyell, architect, 16, Yeomans Row, Brompton Road, S.W.3.

Maghull.—Hotel (£40,000), Eastway; Sir Alfred Shennan & Partners, architects, 17, North John Street, Liverpool.

Manchester.—Maternity block and operating theatre unit, Withington Hospital; H. Wimpenney & Sons, Ltd., builders, Prestwich. Eighteen-storey office block, Portland Street; Leach, Rhodes & Walker, architects, 90, Deansgate.

Houses in Nuthurst Road, Moston (44) and in Cherry Lane, Bredbury (38); director of housing, Town Hall, 2.

Norwich.—Three-storey offices, King Street; St. John Ambulance Brigade, 65, Thorpe Street.

Portsmouth.—New wholesale fruit and vegetable market (£282,000), rear Charlotte Road, and mental health centre (£116,000), Eastern Road, Milton; city architect, Guildhall.

Preston.—Library and eight shops with 13 maisonnettes over, Savick estate; borough engineer, Municipal Buildings.

Purfleet.—Power house extension (£80,000); Thames Board Mills, Ltd.

Salisbury.—Shopping precinct connecting New Canal to High Street; Hammerson Group of Companies, Quadrex House, Park Lane, W.1.

Sedgefield.—Industrial, commercial and housing developments at Ferryhill for Turnbull, Son & Parkinson, estate agents, etc., Station Road, Chester-le-Street; Fennell & Baddiley, architects, Bridge End Chambers, Chester-le-Street.

Sidmouth.—Houses (70), Manstone Lane; U.D.C. surveyor, Sidmouth, Devon.

Teignmouth.—Erection of new theatre and conference hall in Carlton Terrace, for U.D.C.; Louis de Soissons, Peacock, Hodges, Robertson & Fraser, architects, 12, Baring Crescent, Exeter.

Tonbridge.—Houses and bungalows (77), Parkway and Hop Garden Road; Durtell Garden Estates, Ltd., St. Johns Hill, Sevenoaks.

Walsall.—Flats (24), West Bromwich Road; M. E. Habershon, borough surveyor, Council House.

Watford.—Factory, Holywell estate; A. A. Polishers & Platers, Ltd., Loates Lane.

Whittlesey (Northants).—Houses (115); clerk, Council Offices.

Wimborne Minster.—Factory and offices, Churchill Road, Leigh Park; Flight Refuelling, Ltd., Tarrant Rushton Aerodrome, Blandford, Dorset.

Yeovil.—Municipal offices, town hall, library and museum; borough engineer, Municipal Offices, King George Street.

* This information is extracted from the Board of Trade Export Service Bulletin. Inquiries should be addressed to the Board of Trade, Export Services Branch, Lacon House, Theobald's Road, London, W.C.2 (Telephone: Chancery 4411, Ext. 738), quoting the reference given. †Telephone: Trafalgar 8855, Ext. 2010.



KELVINATOR

prices down!

With effect from 30th June, 1961 the prices of all current 1961 British-made Kelvinator domestic refrigerators are reduced. Here are the new prices—

LADY K (K31M)	was 50 gns — now 45 gns — DOWN 5 gns
K46ZP	was 67 gns — now 62 gns — DOWN 5 gns
K60M	was 80 gns — now 72 gns — DOWN 8 gns
K77M	was £109 — now 89 gns — DOWN £15 11s
K94M	was £125 — now 106 gns — DOWN £13 14s
K94MD	was £135 — now 110 gns — DOWN £19 10s

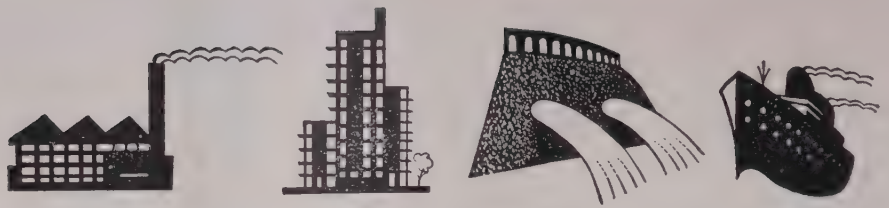
Now at the best buying season for refrigerators, Kelvinator with their world-wide resources have REDUCED PRICES on their complete range of British refrigerators. This is not a special offer but stems from the Company's policy to stabilize production at a level which will maintain the new low prices.

REVIEW YOUR STOCKS AND ORDER NOW

Go right ahead! Display and sell at the new prices. All dealers will be rebated on their current stocks.

DISPLAY MATERIAL to feature these reduced prices is ready now.

DISPLAY & SELL NOW AT THE NEW LOW PRICES



SPENCER WIRE

*Spencers — manufacturers of wire for
over 50 years*

*Bare Copper strip for
transformer winding*

*Bare Copper Strand for
electric motors*

*Bare Copper and tinned wire for
all electrical purposes*

*Super grade bare Copper wire for
enamelling*

Very prompt delivery.

Materials supplied on coils or drums to customers' requirements.

SPENCER WIRE · WAKEFIELD

Telephone: WAKEFIELD 6111

THE SPENCER WIRE COMPANY LIMITED

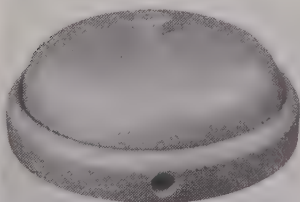
Telegrams: SPENCER, WAKEFIELD, TELEX. Telex No: 55,160.

DaW7761ER



Ironclad Weatherproof bell 4"—12" gongs. Bobbins wound with enamelled copper wire. Heavy terminals. Battery, transformer or mains bell. Can be supplied with Round, Sheep or Church gongs. Conduit entry.

Underdome bell 6" and 8" round gong with conduit entry. Plated gong, soft grey iron base.

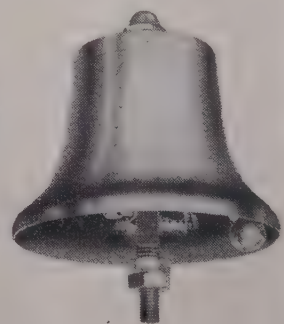


SAX ironclad alarm bells



Heavy Bakelite case, Enclosed terminals, Fitted 3" or 4" round, church or sheep gongs. Wound for battery, Transformer or mains operation.

Underdome church gong bells for use on ambulance, fire tender or factories. Special rubbing contact, voltage 6, 12 24 volt DC. Sizes 8" and 9" gongs in chrome or rough cast bell metal.



★ Catalogue and Prices sent on request

JULIUS SAX & COMPANY LTD
24 COMMERCE RD BRENTFORD Middx

Telephone ISLeworth 6034/5



fire security

*—a vital asset
to every industry*

Throughout the whole field of industry as well as in Electricity Undertakings, electronic and nuclear establishments — the assurance of *complete* protection from *all* electrical fire risks is a vital asset. The Factories Act lays down that *appropriate* means of fire fighting must be provided and maintained — and the Electrical Industry demands specialised fire Safety Equipment to ensure full and uninterrupted light and power. The Pyrene Company provides the most up-to-date automatic fire-warning and CO₂ fire-extinguishing installations for the protection of generators, oil-filled switchgear, alternators, transformers, cables etc. Portable and mobile appliances of every kind employing special liquids, CO₂, dry powder, foam and water are available for every class of fire risk.



Ask the man who knows

All over the world, men charged with the responsibility for fire protection will tell you that the safest answer to any fire problem is to get in touch with The Pyrene Company—and get the right advice backed by 47 years of fire fighting development. Please write to Dept. E.R.7



The illustration shows part of a Pyrene CO₂ Fire Extinguishing Installation, with distribution valve gear and a battery of cylinders, for protection of various areas in a sub-station of the City of London.



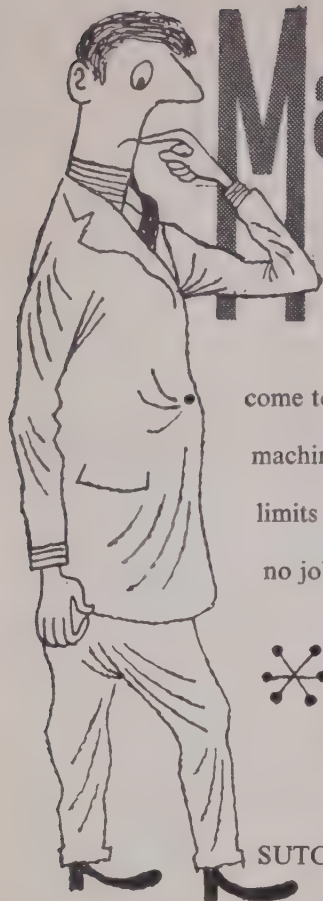
9 GROSVENOR GARDENS, LONDON, S.W.1.

Telephone: victoria 8474

Head Office and Works: GREAT WEST ROAD,

BRENTFORD, MIDDLESEX. Canadian Plant: TORONTO.

Australian Plant: MELBOURNE



May we do your pressing?

For hot pressings and stampings—accurate
well-finished and of consistently high quality—

come to Sutcliffe Speakman. We undertake
machining where necessary and can work to
limits down to .0005". No quantity is too large,
no job too complicated, no standard too exacting.



*In all non-ferrous alloys including aluminium, brass
chromium copper, cadmium copper, manganese bronze and
nickel silver. Also castings in gun-metal, phosphor bronze
and heat-resisting nickel chrome alloys.*



**SUTCLIFFE
SPEAKMAN**

SUTCLIFFE SPEAKMAN AND CO. LIMITED • Leigh, Lancashire • Tel.: Leigh 72101

LONDON OFFICE: 2 CAXTON STREET WESTMINSTER S.W. 1. TELEPHONE: ABBEY 3085

1908 — 53 YEARS — 1961

OF RELIABLE SERVICE IN THE DISTRIBUTION

of

EVERY DESCRIPTION

of

ELECTRICAL MATERIAL

for

EVERY SITUATION

We Handle High-Class Material Only

Our Addresses:

Liverpool:
1-17 Stanley Street

Manchester:
72 Chapeltown Street

Carlisle:
Paternoster
Row

Birkenhead:
94 Chester Street

Workington:
Oxford Buildings
Oxford Street

Telephone: Central 5491
(14 lines)

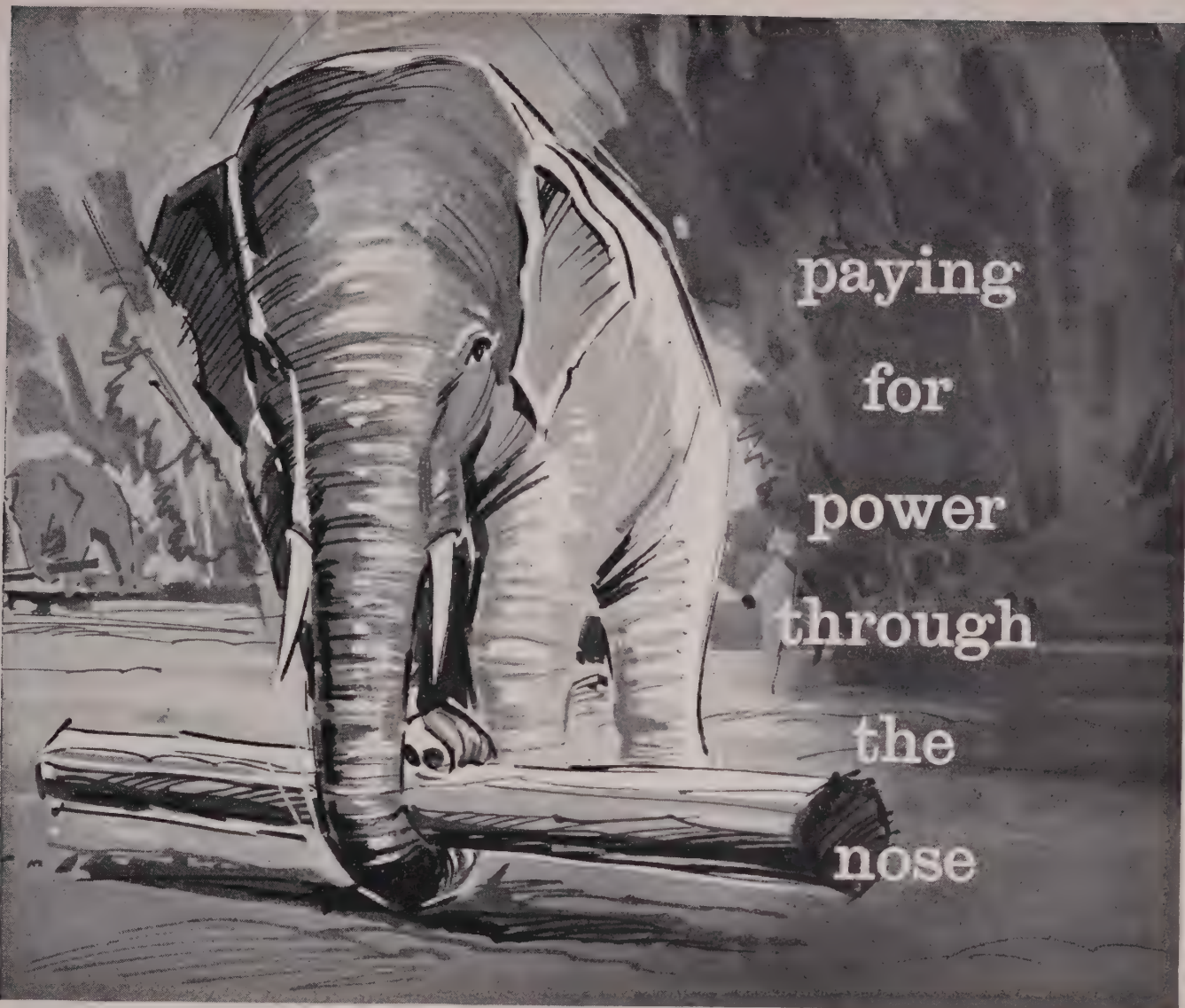
Telephone: Ardwick 5292
(4 lines)

Telephone: 26231-2

Telephone: 4340-1

Telephone: 139

DOWNES & DAVIES LTD.



The capacity to economise is a rare human quality. It is, however, manufactured by STC! We mean, of course, Power Factor Correction and what it can save you by cutting surcharges for kVA.

The low Power Factor associated with most industrial loading—induction motors, welders, furnaces, etc.—can be corrected simply and economically with the latest ranges of Power Capacitors by STC. Employing unit construction, these robustly built, oil-filled capacitors are simple to install, occupy a minimum of floor space and are easily adaptable to changing plant requirements.

Why pay for power through the nose when the capacity to economise is immediately available from STC?

Write for Power Factor Correction Literature to:

STC

POWER CAPACITORS FOR POWER FACTOR CORRECTION



Standard Telephones and Cables Limited

CAPACITOR DIVISION: BRIXHAM ROAD · PAIGNTON · DEVON



COMPONENTS
GROUP

Which way in rubber?



*Will direct you-
precisely!*

P.R. Research Laboratories offer the widest range of synthetic rubber compounds available, all developed to meet the exacting and varied working conditions of modern industry.

P.R.'s advanced production techniques and the strict control of all manufacturing operations ensure mouldings and extrusions of the highest grade and to close dimensional accuracy.

Please write for technical literature.



The Symbol of precision

in rubber engineering

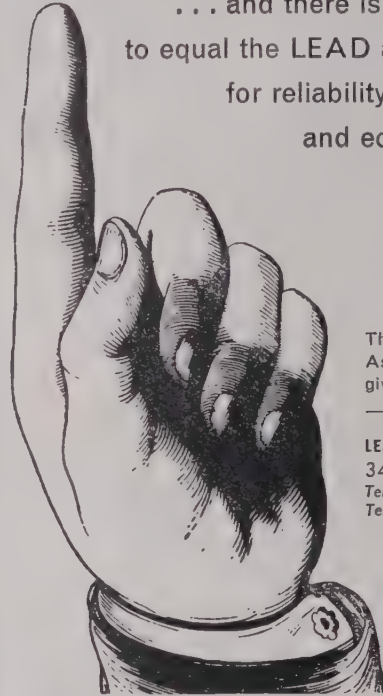
PRECISION RUBBERS LIMITED
BAGWORTH • LEICESTER • TEL: BAGWORTH 361/6



for confidence
in cables

TRUST **LEAD**

... and there is nothing
to equal the LEAD acid battery
for reliability
and economy



The technical officers of the Association are always glad to give individual assistance.

LEAD DEVELOPMENT ASSOCIATION,
34 Berkeley Square, London W.1
Telephone: GROsvenor 8422
Telegrams: Leadevop, Wesdo, London



LDA4/61

PLANNING FOR

Perfection

AIMING TO PRODUCE AN EVEN BETTER
ELECTRIC SINK WATER HEATER?



Perfection right down to the smallest detail... that's naturally your aim. When it comes to Control Cocks, call in the SANBRA Design Team. We have the facilities to design and produce Control Cocks, exactly to your requirements. Our Chief Designer will be pleased to call and discuss your problems entirely without obligation.

illustrated is a typical SANBRA
Angle pattern Control Cock

Regd. Design 893834



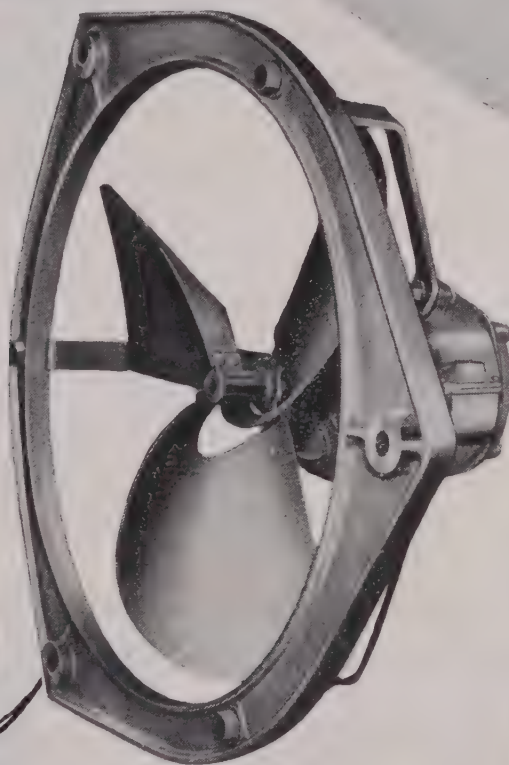
CALL IN **Sanbra** AT THE DESIGN STAGE

SANBRA Ltd., ASTON HALL Rd., BIRMINGHAM 6. Tel.: EAST 1231 (5 lines)
Designers and Manufacturers of a complete range of fine quality Plumbers' Brassfoundry

9" to 48" FANS



ONE TWO AND THREE PHASE



MOTOR. Of the Squirrel Cage Totally Enclosed Type complying with the B.S. Specification, terminal cover screwed for conduit. On single phase the Motor is supplied with a condenser permanently connected for power factor correction and quiet running.

CONSTRUCTION. The Motor is secured to a Ring which is a high grade iron casting of extremely robust construction by arms of forged mild steel of ample strength to give rigidity to the complete Unit.

BLADES. Made from high quality mild steel sheets, vanes riveted to a centre boss and designed to give maximum output with minimum power consumption.

Many sizes available EX-STOCK

*Leaflet giving full details
available on request.*

PLEASE QUOTE P105E107

TOTALLY ENCLOSED

HOWELLS

(ELECTRIC MOTORS) LTD
HANLEY · STOKE-ON-TRENT

Branches at

LONDON · MANCHESTER · BRISTOL
BIRMINGHAM · GLASGOW · LEEDS

CHANNEL "Spring Capped" CONDUIT

ELECTRICAL TRUNKING

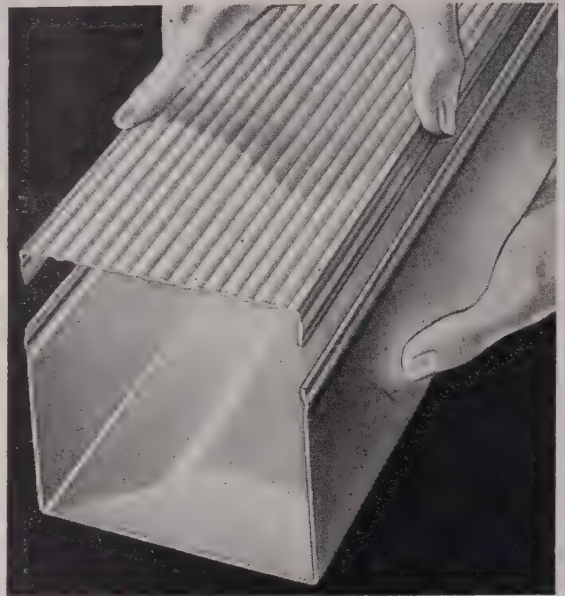
*saves time,
money & trouble*

- * Easier and cheaper to install.
- * Wiring instantly accessible for maintenance.
- * Ideal for power, lighting, telephone and intercommunication systems.

Available in the following sizes:

1" x 1/2", 1" x 1", 2" x 1", 2" x 2", 3" x 2", 3" x 3",
4" x 3" and 4" x 4"

CHANNEL
"Spring Capped"
CONDUIT



Write or telephone for Publication No. RA218

CHANNEL CONDUITS LTD., STATION ROAD
WINSLOW, BLETCHLEY, BUCKS

Telephone: Winslow 337

RA 218

A NEW NAME MEANING
COMPLETE SAFETY IN
POWER SUPPLIES TO
TRAVELLING
CRANES



Manguard

SAFETY SUPPLY SYSTEM
(Prov. Patent No. 31568/58)

PRINCIPLE

The principle of Manguard is the provision of a set of flexible bar collectors on the crane and electrically protected contact boxes at intervals along the crane track connected by insulated cable.

SAFETY FEATURES

- Contact box spacing ensures an electrical supply to the crane at all times.
- Each contact box has its own contactor ensuring that the contact studs are alive only when in contact with the crane collector bars.
- The crane collector box is fabricated in fibreglass. The four contact bars are bedded in flexible polyurethane, giving long life and minimum maintenance.
- Isolation of any section may be readily carried out.
- MANGUARD equipment may be fitted to existing cranes.

DEBERGUE MACHINE TOOLS LIMITED
WEST GORTON, MANCHESTER 12
TELEPHONE: EAST 2771 (6 LINES) TELEGRAMS: DEBERGUE, MANCHESTER



Rolled thread screws

Take no chances about your supplies of Rolled Thread Screws—specify **ORMOND** and so make sure of both quality and quantity—delivered right on time and straight from our extensive stocks. For your individual requirements, we will gladly submit special quotations. Send for lists, which in addition to detailing Brass, Steel and Light Alloy Screws in Rolled and Cut Threads, also feature Grub-screws, Nuts, All-threads, Hexagon Bolts and Set-screws turned from bar and Cold Headed Grades "A", "B" and High Tensile. The repetition parts range covers single and multi-spindle automatics up to $1\frac{1}{2}$ " diameter.



THE ORMOND ENGINEERING CO. LTD.

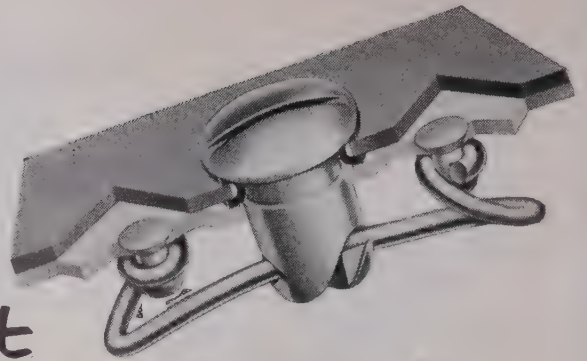
Ormond House • Rosebery Avenue • London, E.C.1 Telephone: TERminus 2888 Telegrams: "Ormondengi, Cent"

DZUS

the most efficient

FASTENING

for the Electrical Industry



- DZUS lock or unlock instantly in a simple quarter-turn
- DZUS are vibration-proof
- DZUS are simple, sure and secure
- DZUS are ideal for hinged or removable parts needing frequent attention and inspection

DZUS Fasteners offer the most effective, most efficient, and *quickest* form of fastening for scores of vital uses in Electrical development.

Typical uses include: Inspection Panels, Machine Guards, Switch and Fuse Boxes, Trap Doors, Radio Installations, Lighting Installations, etc.

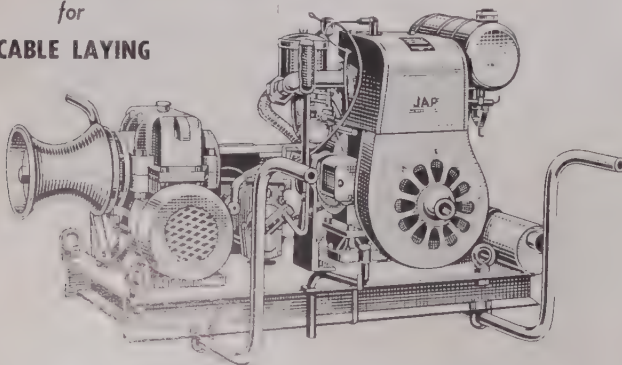
Write for full details of applications in your industry to:

DZUS FASTENER EUROPE LTD • FARNHAM FACTORY ESTATE • GUILDFORD ROAD • FARNHAM • SURREY

THOMPSON

1-TON PULL WINCH (Model 39)

for
CABLE LAYING



The Model 39 is ideal for trench cable pulling work with its capacity of 1-ton pull at 45 ft per minute. The winch has been designed with 4 lifting handles for ease of man-handling on site and is powered by 4½ h.p. J.A.P. petrol engine, or Villiers diesel engine. It has forward and reverse gear box and a winch which is fitted to the winch frame. Price £220 0s. 0d. Ex Works.

Write for full details to:

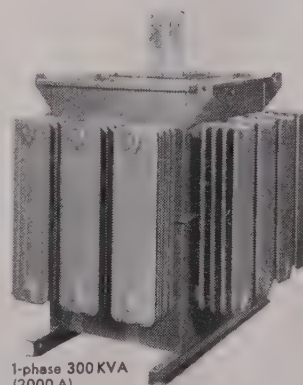
THOMPSON BROS.

MANUFACTURERS LIMITED

ARCHERY WORKS • ARCHER ROAD • WIMBORNE • DORSET • LONDON, S.E.9
Telephone: ELTham 5522/3

Sturdy

POWER TRANSDUCTORS



1-phase 300 KVA
(2000 A)
Transducer

for
CONTROL
of
A.C.
up to
750 KVA

For details write to:

STURDY ELECTRIC CO. LTD.

HAMSTERLEY COLLIERY, NEWCASTLE UPON TYNE
Telephone: Ebchester 271-272 Telegrams: Sturditran, Newcastle upon Tyne



silver-faced-and new!

JMC OFFER A NEW SILVER-FACED RIVET CONTACT THAT CUTS PRODUCTION COSTS FOR LARGE-SCALE USERS

The most recent development in JMC contacts, this new silver-faced rivet offers definite advantages to large-scale users:

- ★ Solid copper body with a permanently bonded silver contact face
- ★ Uniform thickness of silver over entire head
- ★ Hard silver face combined with soft copper shank for ease of riveting
- ★ Flat, domed or hemispherical head forms
- ★ Head sizes from $5/32"$ dia. to $5/16"$ dia.
- ★ Wide variation in dimension ratios
- ★ A number of preferred sizes available shortly for quick delivery in quantities of 10,000 upwards. Additional preferred sizes will become available during 1961, thus completing a most comprehensive range



AN IDEAL COMBINATION OF ECONOMY AND EFFICIENCY

Please ask for full technical data

This new silver-faced contact is one of the many types featured in our booklet 1302 "Electrical Contacts". Copies are available free on request.

Johnson  Matthey

JOHNSON, MATTHEY & CO., LIMITED, 73-83 HATTON GARDEN, LONDON, E.C.1

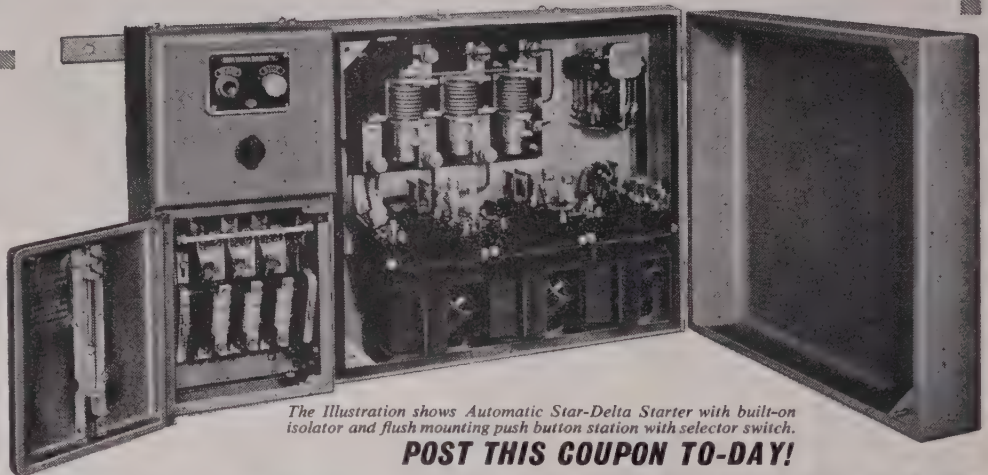
Telephone: Holborn 6989

Vittoria Street, Birmingham, 1. Telephone: Central 8004

75-79 Eyre Street, Sheffield, 1. Telephone: 29212

BKS AUTOMATIC STAR-DELTA STARTERS

This range of automatic star-delta starters is suitable for controlling motors up to 55 h.p. on 380/440 volts, three-phase supply, and utilised in their construction are our now famous heavy duty contactors, which are fitted with solid silver contacts, air-break; the solenoid assembly only is oil-immersed, but **NO MAINTENANCE IS REQUIRED**. This unique design prevents contact bounce by controlling the speed of the contact make and break, thereby increasing the contact life considerably. No other contactor has this feature.



The Illustration shows Automatic Star-Delta Starter with built-on isolator and flush mounting push button station with selector switch.

POST THIS COUPON TO-DAY!

BRITISH KLOCKNER SWITCHGEAR LIMITED

Head Office and Works: **CHERTSEY, SURREY**. Tel: Chertsey 3467. Grams: Switchgear Chertsey.

SALES OFFICES

LONDON: Refer to Head Office.
MANCHESTER: Cromford House, Cromford Court, Manchester 4. Tel: BLAckfriars 3903.
GLASGOW: 73 Robertson Street, Glasgow C.2. Tel: CENTral 2479.
NEWCASTLE: Mr. H. Breeze, 4 Beechwood Avenue, Monkseaton, Whitley Bay, Northumberland. Tel: Whitley Bay 24231.
WEST MIDLANDS: 2-3 Graham Street, Birmingham, 1. Tel: CENTral 6693.
EAST MIDLANDS: Mr. D. A. Crossley, 38 St. Mawes Avenue, Wilford, Nottingham. Tel: Nottingham 89023.
 Associated Company: Hindustan Klockner Switchgear Private Ltd., Bombay.

To **BRITISH KLOCKNER SWITCHGEAR LTD. CHERTSEY, SURREY**

Please send me your latest comprehensive catalogue.

NAME

POSITION

FIRM

ADDRESS R 42/47

MEKELITE



For wall, bench or machine mounting. Catalogue sent free on request.

MEK-ELEK Engineering Ltd., MITcham 3072
 17 Western Road, Mitcham, Surrey.

PORTABLE FURNACE & PATENTS CO.

CARRINGTON, NOTTINGHAM, ENGLAND

Phone 64887

Established 1885



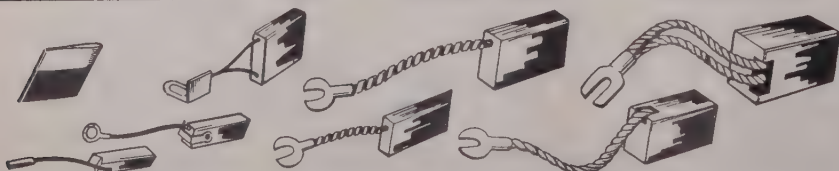
TYERS JOINTERS FURNACE

Write for our new **COMPOUND BUCKETS** and **KETTLES** list.



CONTACTS

In copper, brass, bimetal, silver, tungsten, phosphor bronze etc. Angles, rivets, tips, segments, contact springs. Any metal—any shape.



CARBON BRUSHES

In all grades, shapes and sizes for every industrial purpose. Send old or new samples or drawings for keen prices and reliable service.

PAXTONS (ELECTRICAL) LTD · WESTON-S-MARE

TEL: WESTON-SUPER-MARE 1367

PLATINUM METALS* ARE INDUSTRIAL METALS

OFFERING THESE OUTSTANDING PROPERTIES

Exceptional Chemical Inertness
High Temperature Stability
Superior Wear Resistance
Peak Catalytic Activity
Low Vapour Pressure



PLATINUM • PALLADIUM • RHODIUM • RUTHENIUM • IRIIDIUM • OSMIUM

Some
Industrial Uses
of

PLATINUM METALS

A Platinum Metal may be the
Cheapest answer to a heat or
corrosion problem.

Send for this booklet to:

The United Kingdom Atomic Energy Authority
solved a product contamination problem by
lining furnace ignition trays with platinum. They
took advantage of the high temperature stability
and exceptional chemical inertness of the
Platinum Metals.

*Engelhard Industries Limited fabricate and market the Platinum Metals
refined by The International Nickel Co. (Mond) Ltd.*

ENGELHARD INDUSTRIES LTD

BAKER PLATINUM DIVISION
52 HIGH HOLBORN
LONDON WC1

TGA PM7

When does



"take off" vertically?



**NEWTON
DERBY**



... when the Westland Wessex I rises from the ground.

Newton Derby Voltage Regulators are a vital part of the electrical system in this turbine-driven machine which is in quantity production for the Royal Navy and which is fitted with automatic equipment to allow operation by day and by night, in all weathers, from ship or from shore.

- Motor Generator Sets
- Permanent Magnet Alternators
- Transistor Convertors
- High Frequency Alternators (400 to 3,000 c.p.s.)
- Automatic Voltage Regulators
- Servo Motors
- Rotary Transformers and Convertors

NEWTON BROS. (DERBY) LIMITED

ALFRETON ROAD, DERBY

Telephone: Derby 47676 (4 lines). Grams: DYNAMO DERBY

London Office: IMPERIAL BUILDINGS, 56 KINGSWAY, W.C.2



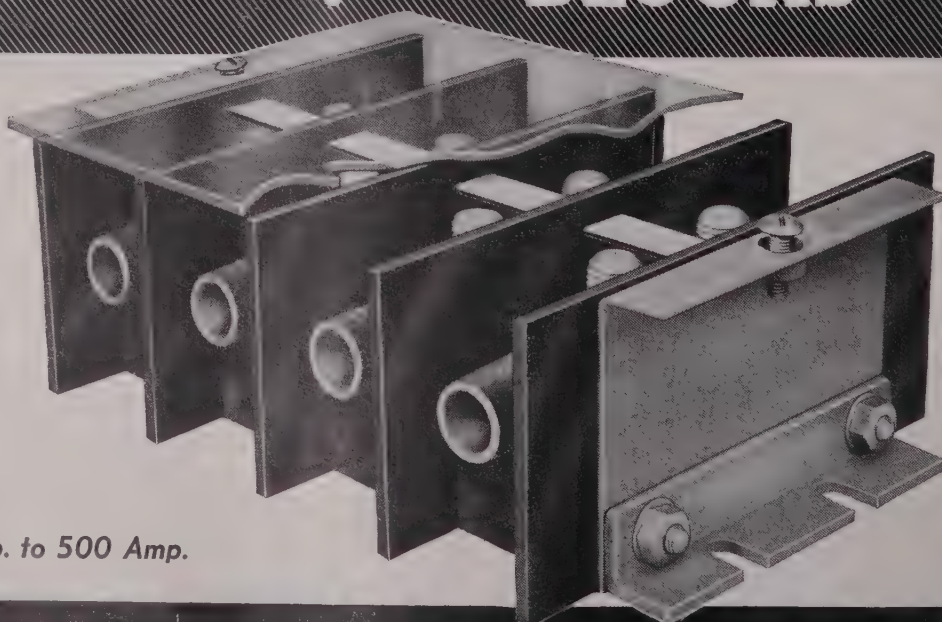
Multiway **TERMINAL
BLOCKS**

Available in ...
120, 200, 300
and 500 Amp.

Ratings

WITH SOLID OR
REMOVABLE LINKS

STANDARD RANGE OF
TERMINALS from 15 Amp. to 500 Amp.



*Detail on
Request*

AUSTIN TAYLOR ELECTRICAL LTD.

THORLEY ST • FAILSWORTH • MANCHESTER

Tel:
FAILSWORTH
3246

ENBRAY NEW CONTACTORS

FOR 100 AND 200 AMPS

B.S. 775 ratings Type 2T2—100 amp A1 or A4; Type 2T4—200 amp A1
Mechanical duty Class IV—5 million operations

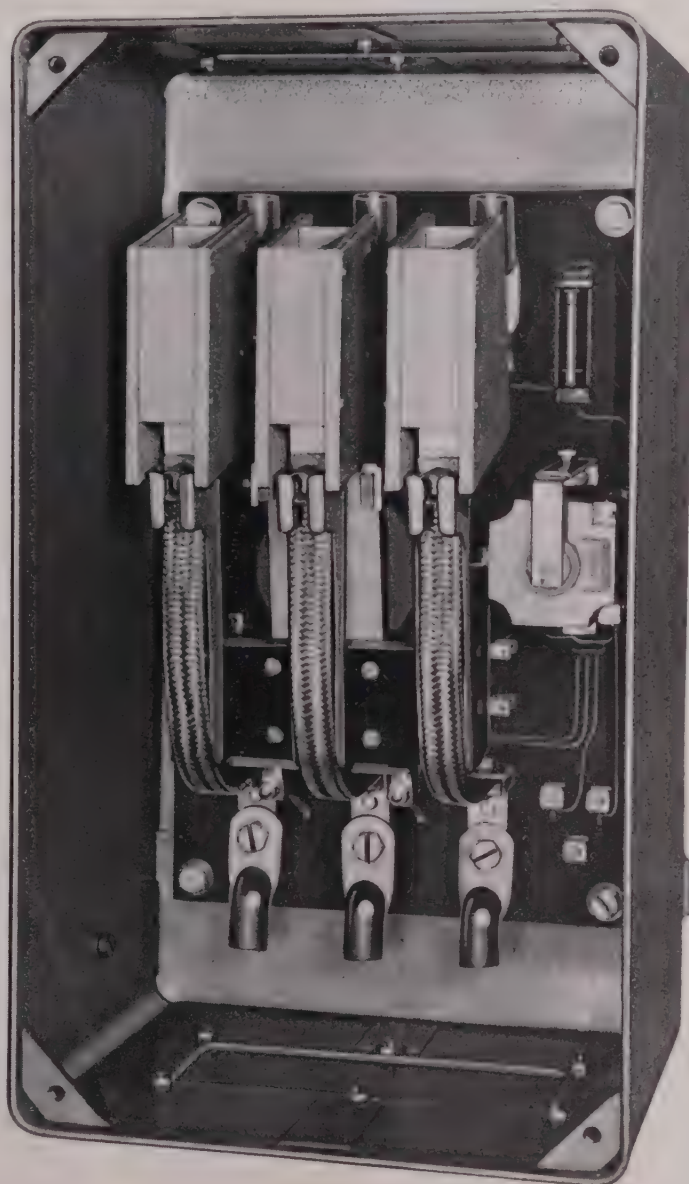
Ample space for cabling
(even more space on
200 amp size).

De-ion type arc shields.

Self-aligning moving con-
tacts with copper or silver
facings.

Moving armature sup-
ported on knife edge
hinge with unique anti-
tilt device.

Whole moving assembly
is removable without the
use of tools—simply un-
clip the twin pull-off
springs.



Supplied open type or
in sheet steel box with
hinged lift off cover and
two removable gland
plates.

Control circuit fuse.

Large fixed contacts—
adjustable for wear.

Full wave metal rectifier
for coil.

Provision for fitting 4NO
and 4NC auxiliary con-
tacts.

All contacts fully in-
sulated from magnet,
frame.

Cable sockets of
ample size.

These contactors super-
cede previous types CNT
and CRT.

Type 2T230—100 amp

MAKERS OF QUALITY CONTROL GEAR FOR NEARLY FORTY YEARS

ENBRAY LTD ENBRAY

Head Office and Works : Britannia Road, Waltham Cross, Herts.

Telephone : Waltham Cross 22212-5

Branches : Glasgow: 190 West George Street, Glasgow, C.2.

Telephone: Douglas 1271

Manchester: Canada Chambers, 36 Spring Gardens, Manchester 2.

Telephone: Blackfriars 4791

Birmingham: 19 Darnel Hurst Road, Little Sutton, Sutton Coldfield.

Telephone: Four Oaks 2185

London and South: Apply Head Office.

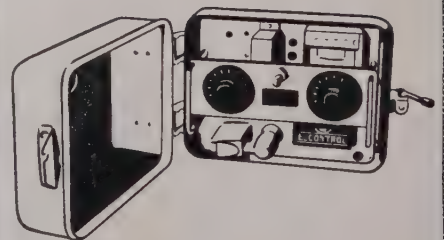
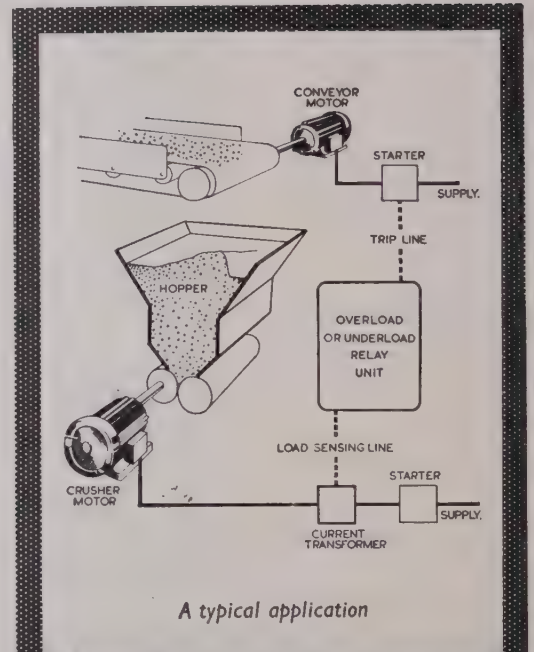
AUTOMATION

STEP

BY STEP

Overload Relays

A useful electronic load monitor which will, for example, stop a conveyor feeding a mill when the mill motor current rises to the safe maximum limit. These relays can be accurately set to trip at a pre-determined load, and will give automatic protection and re-start for all sorts of electrically driven set-ups, simple or complex.



Overload (or Underload) Relay unit open showing the two control dials

ELCONTROL *electronic control systems*

ELCONTROL LTD • HITCHIN • HERTS • Hitchin 2411

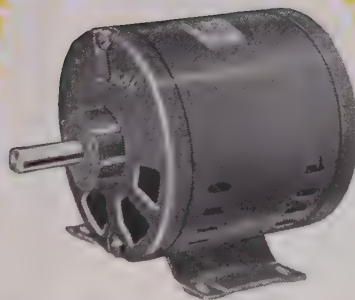
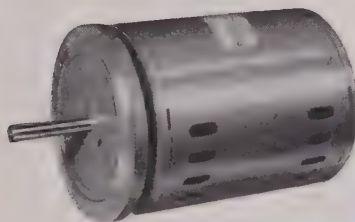
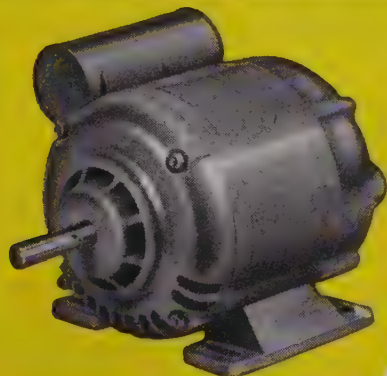
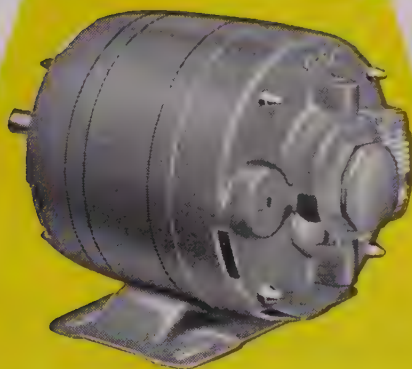


The word ELCONTROL is a regd. Trade Mark

Appointed Agents

MIDLANDS:
A. M. LOCK & Co. Ltd., Newborough Rd., Solihull Shirley 5703
N. WEST:
A. M. LOCK & Co. Ltd., Union St., Oldham Main 6744
SCOTLAND:
A. R. BOLTON & Co. Ltd., Bankhead Dr., Sighthill, Edinburgh 11 CRA 5235/6
and Overseas Agents

Telephone

$\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{6}$ $\frac{1}{8}$  $\frac{1}{20}$  $\frac{1}{10}$ $\frac{1}{40}$ $\frac{1}{2}$ $\frac{1}{12}$  $\frac{1}{80}$ $\frac{1}{16}$ 

The General Electric Company Limited of England has over 50 years experience in the design and manufacture of fractional horse-power motors. Many thousands of special designs are being produced for particular applications. G.E.C. engineers will be pleased to help at the design stage to choose the right fractional for the job.

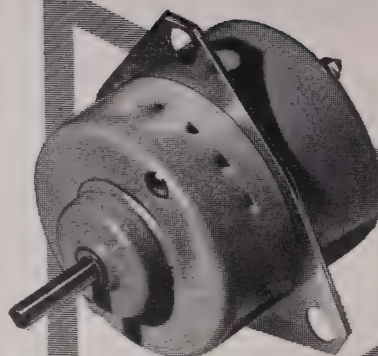
Service is excellent through G.E.C. branches and distributors throughout the world.

**for
fractional h.p.
motors
rely on
the experience of**

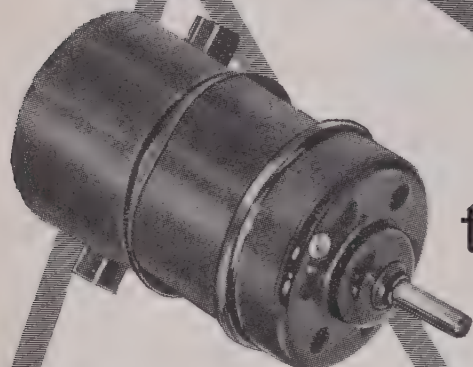
G.E.C.



Delco 625 Type

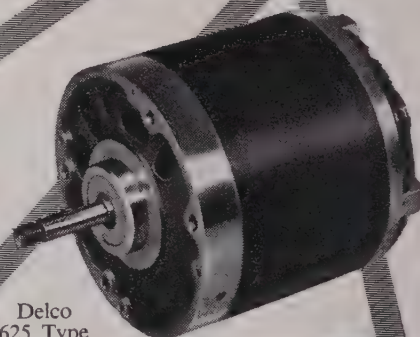


Delco 258 Type

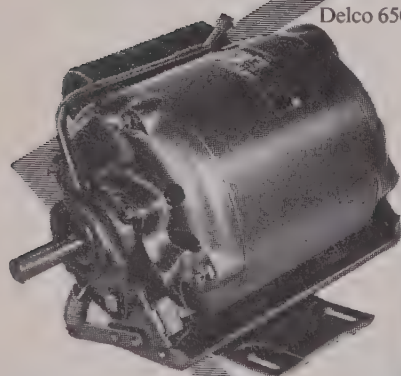


Delco 310 Type

tailored
to fit
your
product

Delco
625 Type
(Special Purpose)

DELCO electric motors



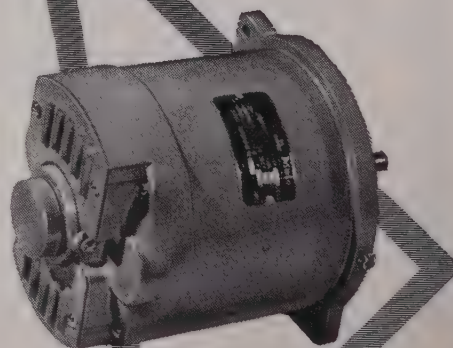
Delco 650 Type

Whether you are designing a new motorised appliance or re-designing an old one, there's a Delco motor ready made for your product . . . or one that can easily be tailored to fit perfectly. For informative literature on the Delco range please write to the address below. For expert advice on your power problems call in a Delco motor engineer TODAY.

Delco Motors

are suitable for driving

Washing Machines; Spin Driers; Food Mixers; Projectors; Refrigerators; Air Conditioners; Oil Burners; Fans; Office Machinery; Lawn Mowers; Furnace Blowers; Water Pumps; Farm Machinery; Waste Disposal Units; Vegetable Peelers and many other domestic and industrial applications.

Delco
Oil Burner
Type

simple
easily installed
permanent—

crimpits



Crimpit compression connectors give you reliable connections with low contact resistance . . . high corrosion resistance . . . stability under all load conditions.

Crimpits are easily and quickly installed with BICC-BURNDY mechanical or hydraulic controlled-pressure hand tools.

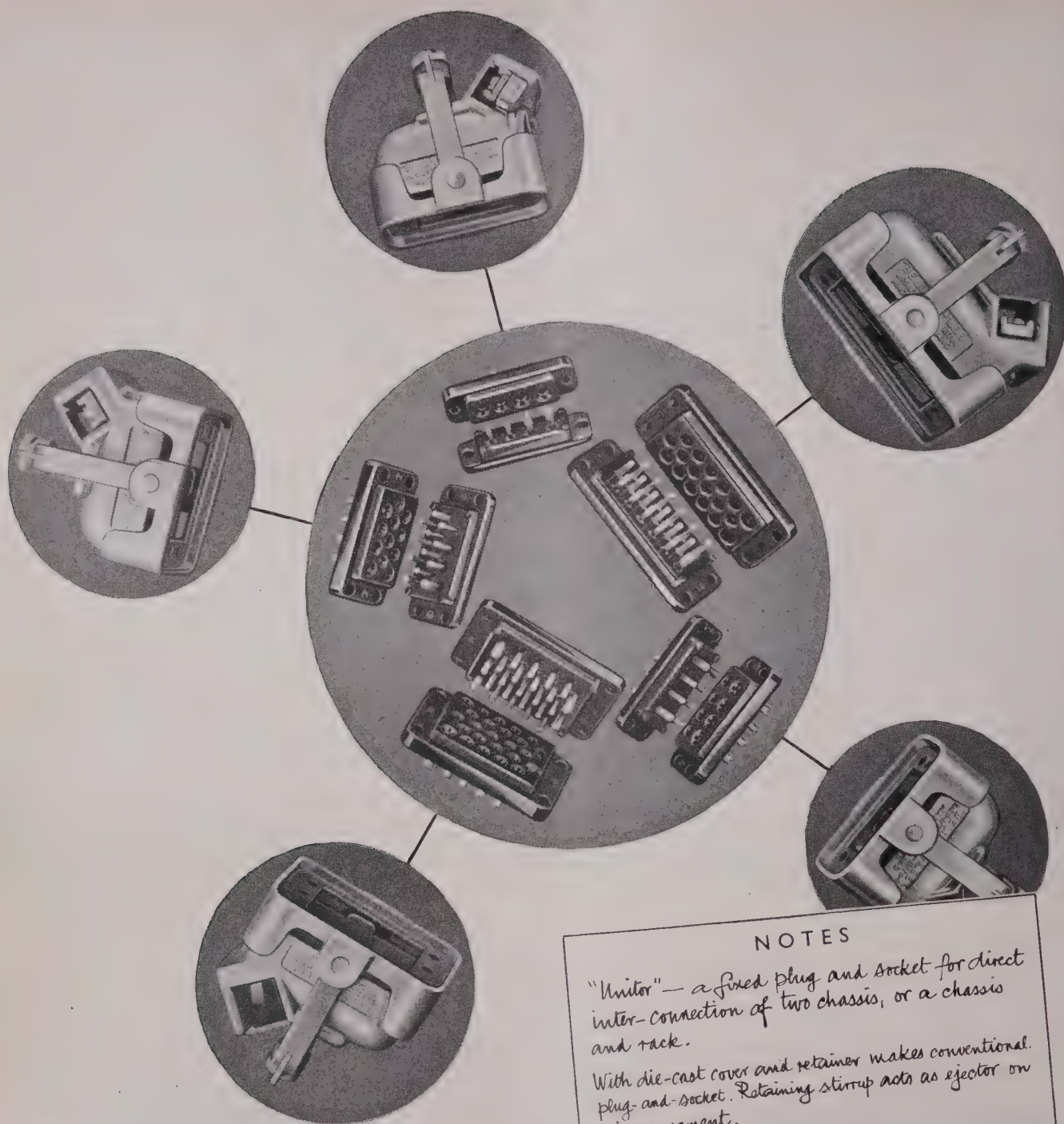
Crimpits are available for copper-to-copper, aluminium-to-aluminium and aluminium-to-copper conductors. They can be used on solid or stranded conductors, and are suitable for a variety of applications including tap connections and dead-ends.

*Let our technical department put you in the picture.
Write in for the full story.*

BICC-BURNDY

BICC-BURNDY LTD • PRESCOT • LANCs





NOTES

"Unitor" — a fixed plug and socket for direct inter-connection of two chassis, or a chassis and rack.

With die-cast cover and retainer makes conventional plug-and-socket. Retaining stirrup acts as ejector on disengagement.

With two covers makes effective cable connector. No retainer necessary since pull on cables is at 45° to normal.

4, 8, 12, 18 and 25 ways. Voltage proof: 2 kV; current rating 3 and 10 amp. Type approved to DEF. 5321:1958.

Must get full spec. from "Belling-Lee"!

"Belling-Lee"

UNITOR PLUGS AND SOCKETS*

TERMINALS • PLUGS & SOCKETS* • GLASS SEALS
CIRCUIT PROTECTION DEVICES
INTERFERENCE FILTERS • RECEIVING AERIALS

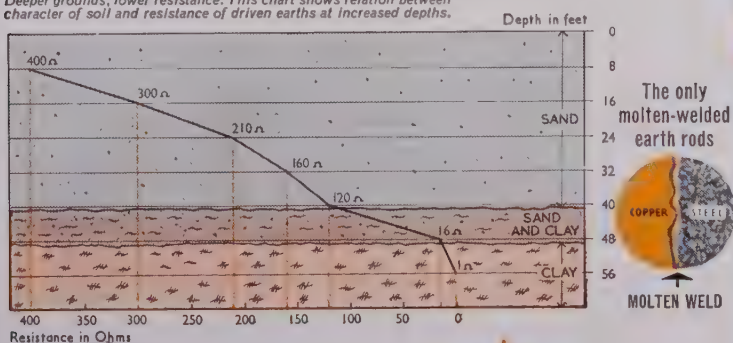
BELLING & LEE LTD
GREAT CAMBRIDGE RD., ENFIELD, MIDDX., ENGLAND

Telephone: Enfield 5393 • Telegrams: Radiobel, Enfield

DRIVE DEEP FOR SAFETY

with CHILTON COPPERWELD SECTIONAL EARTHING RODS

Deeper grounds, lower resistance. This chart shows relation between character of soil and resistance of driven earths at increased depths.



Drive your Earthing Rods deep into the ground if you want to be sure of safe earthing. In many areas the low resistance soil is at a deep level which cannot be reached by rods of standard material. Copperweld Sectional Earthing Rods can easily be driven to depths of 40 feet or more if necessary, with remarkable reduction in earth resistance. These sectional rods have a tough steel core to withstand driving, and a thick molten-welded copper coating for electrical conductivity which also eliminates corrosion. A single Copperweld deep-earth electrode is cheaper than multiple earth rods, occupies less space and is more efficient. Publication TL 14ER giving full information supplied on request.

CHILTON  **ELECTRIC**
HUNGERFORD

PRODUCTS LIMITED

B E R K S. Telephone: Hungerford 237/8

London Office:

19 Old Queen Street, S.W.1. Tel: TRAfalgar 2239

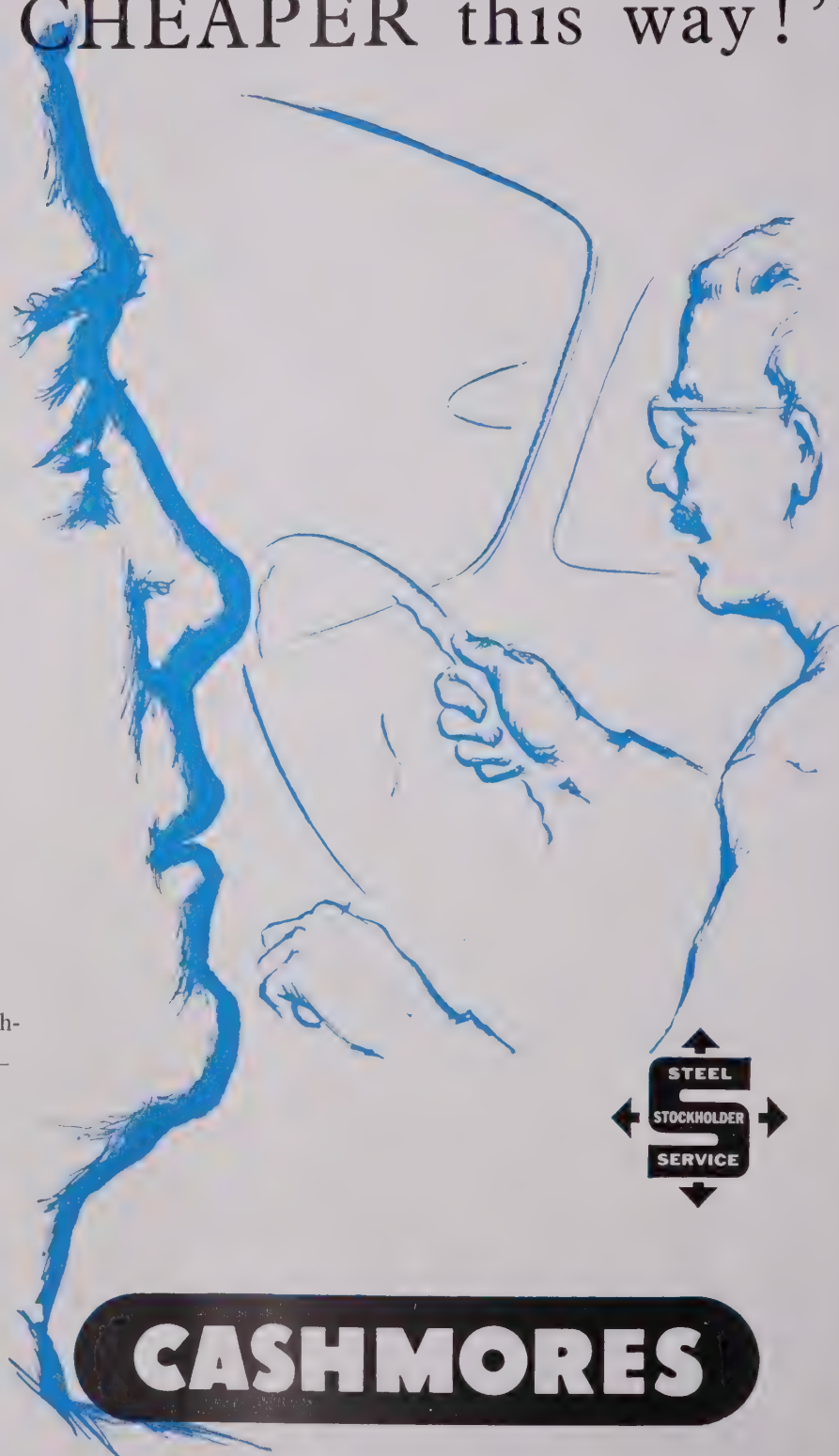
“... but STEEL SHEETS are CHEAPER this way!”

“... and I've been saying
so for years and that's why
I go to CASHMORES.

As Accredited Sheet Stock-
holders of the Steel
Company of Wales Limited,
they have all the production
resources of this great
mill behind them.

Cashmores hold compre-
hensive stocks of cold
reduced and hot rolled
sheets and with their up-
to-date shearing facilities
and two modern cut-up lines
for coils, I can get all the
sizes I want — and quickly.
I've no need to finance large
stocks of my own or use up
valuable production space to
store it. With their speedy
delivery fleet you can say Cash-
more's stocks are my stocks —
that's why it's cheaper all
round!

I suggest you write in for
their stock list.”



CASHMORES

J O H N C A S H M O R E L I M I T E D

Accredited Sheet Stockholders of the Steel Company of Wales Limited

G R E A T B R I D G E • T I P T O N • S T A F F S N E W P O R T • M O N .

Telephone: TIPTon 2181/7

Telephone: 66941/6

London Office: Artillery Mansions, 75 Victoria Street, London, S.W.1

Telephone: ABBey 4556/7/8

REAL

Watertight Protection

Come hail, rain or shine, R.E.A.L. Non-Corrosive Watertight Fittings stand the test of time in any part of the world. There just isn't anywhere in this all-porcelain one-piece fitting where rain or damp of any kind can do damage. Incidentally, it's a matter of seconds to unscrew the well glass to fit a replacement lamp. This is R.E.A.L. saving in time, money and maintenance!

*with***REAL**

Watertight Fittings

R.E.A.L. is the registered trade mark of
ROWLANDS ELECTRICAL ACCESSORIES LTD., R.E.A.L. Works, Birmingham, 18



Patent No. 568702

Catalogue No.
P5806 gives details
of all sizes from
60 watt to 500 watt.

Lionel Robinson

& Co. Ltd.

DISTRIBUTORS
OF

102
Abbey
Street
Accrington
Accrington 32774

47
Museum
Street
Warrington
Warrington 34391/2

161-163 Eldon Street
Preston
Telephone—Preston 57975/6

4 Staple Inn
London, W.C.1
Telephone - - Holborn 6322

**PLASTIC
MOULDINGS**

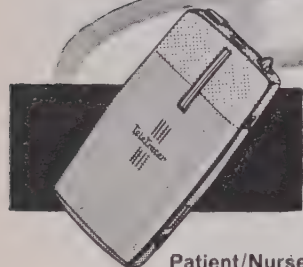
FREDERICK W. EVANS LTD.
Plastic Works, Long Acre, Birmingham 7. Tel. East 3071-2-3

NIRA

Signalling ▶



A complete chain



Patient/Nurse
Intercommunication ▶

◀ Wireless Pocket Paging



◀ Nurse-Call



Radio/TV Distribution ▶



◀ Departmental
Intercommunication



throughout your hospital

In many of the world's most up-to-date hospitals, you'll now find NIRA installed. Everywhere, NIRA is recognised as by far the most advanced communication equipment made. It is ultra-efficient, reliable and simple to operate. NIRA is *one* communication system manufactured by *one* company, designed, installed and serviced by *one* organisation. Our project engineers are at your service to plan *your* communications.

Full information from—

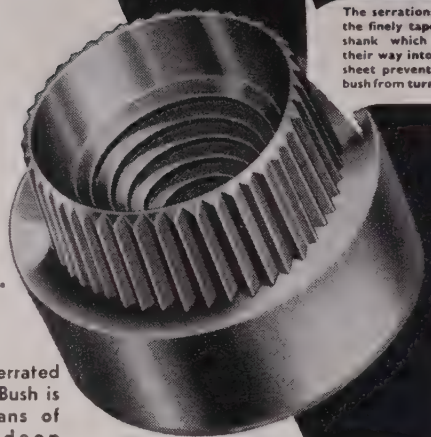
CASS ELECTRONICS LTD

Chertsey, Surrey. Tel:—Chertsey 3481 (3 lines)

The Only One

OF ITS KIND....

The Patent Serrated Anchor Rivet Bush is the best means of providing deep tapped holes in thin sheet metal.



The serrations on the finely tapered shank which cut their way into the sheet prevent the bush from turning.

"PRECISION"
PATENT SERRATED

*write for
leaflet 220*

ANCHOR RIVET BUSH

THE PRECISION SCREW & MFG. CO. LTD.

UNION ST. WILLENHALL STAFFS.

PHONE: WILLENHALL 621

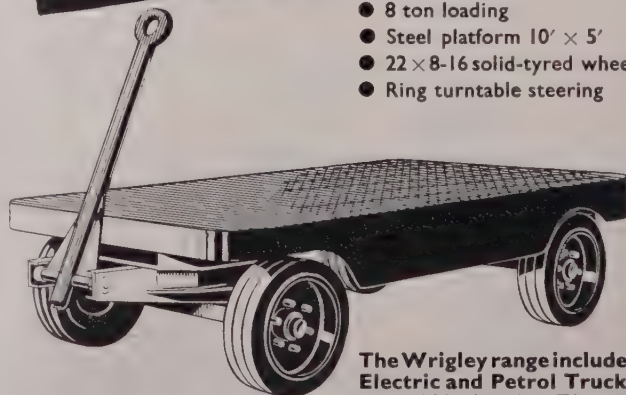


TRAILERS ★

full range up
to 20 tons

MODEL 63

- 8 ton loading
- Steel platform 10' x 5'
- 22 x 8-16 solid-tyred wheels
- Ring turntable steering



The Wrigley range includes: Electric and Petrol Trucks; Fork Lift Trucks; Tippers; Repair and Maintenance Trucks; Dumpers; Tractors; Trailers; Tugs; Hand Trucks and Trolleys.

SEND FOR FULLY ILLUSTRATED LEAFLETS

London Area Sales & Service
185 TURNER'S HILL
CHESHUNT, HERTS
Tel: Waltham Cross 1115

Midland Area Sales & Service
188/190 LYTHALLS LANE
COVENTRY
Tel: Coventry 88171

WESSEX INDUSTRIES (POOLE) LTD
WEST STREET POOLE DORSET

Tel: POOLE 2000

DISTRIBUTION FUSEBOARDS

Simplex Star "dead-front"

Distribution Fuseboards are: low in price • easy to wire • completely safe because all live parts are shrouded, even with the fuses removed. There is provision for: circuit identification on the fuse bank and neutral connections • surface or flush mountings,

Ratings — 15, 30 or 60 amp, 500 volt A.C. or 250 volt D.C.

Star Economy Distribution Fuseboards offer the same advantages as the Star Distribution Boards at the lowest possible price. More details of Simplex Star Distribution Fuseboards available on request.

SIMPLEX ELECTRIC COMPANY LTD.

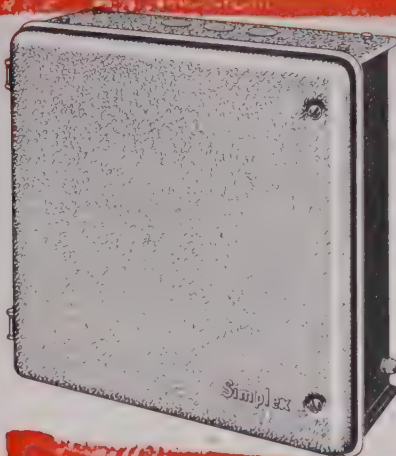
CREDA WORKS, BLYTHE BRIDGE
STOKE-ON-TRENT, STAFFS

Branches throughout Britain and
Agents throughout the World

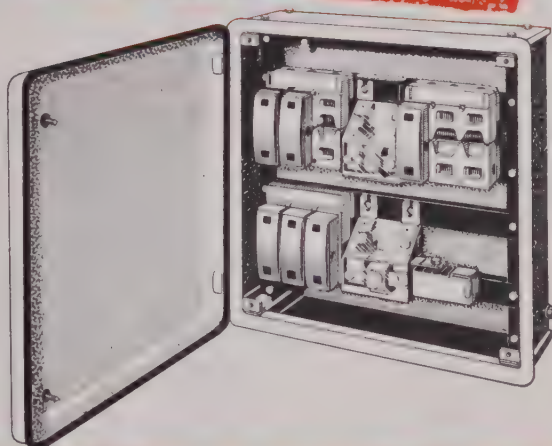


ELECTRICAL DIVISION

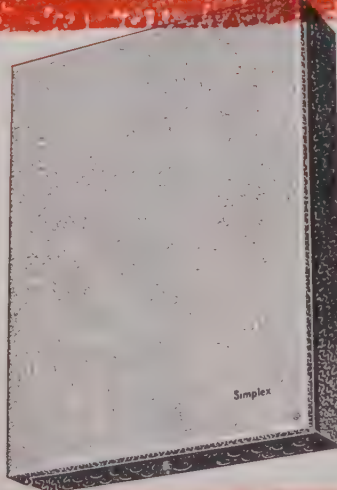
Simplex Star Switchgear



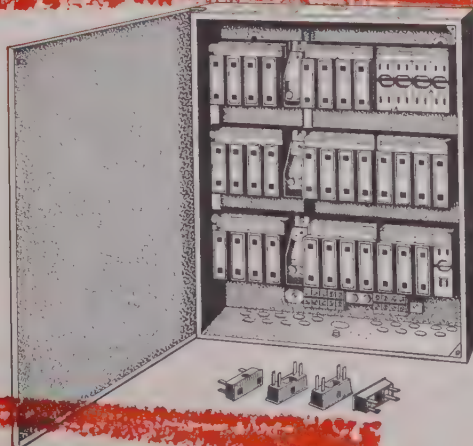
Star Distribution Fuseboard. Neat appearance. Strong All-Steel case.



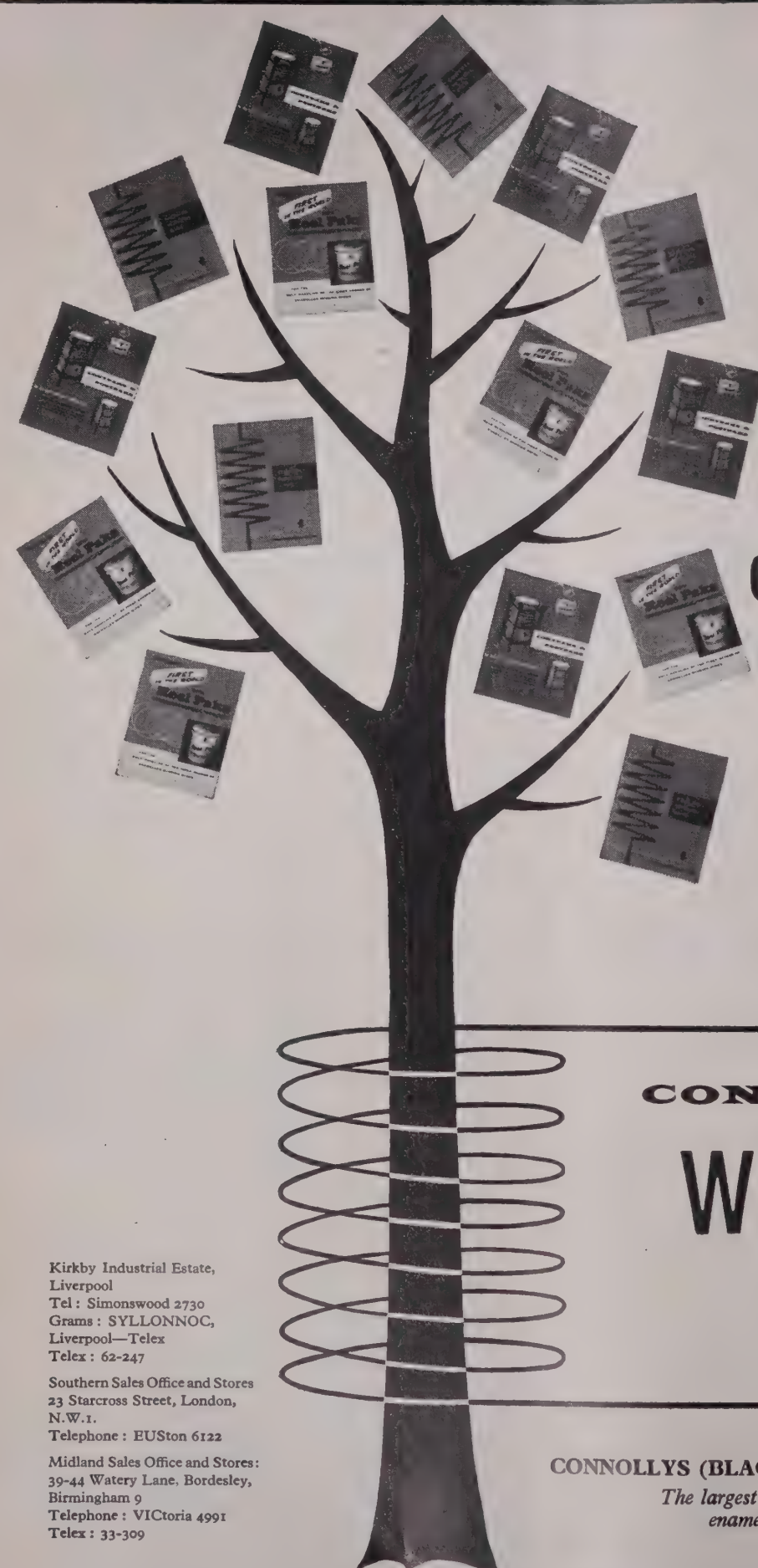
Star Distribution Fuseboard with cover open; some fuses are removed to show dead-front feature.



Star Economy Distribution Fuseboard.



Star Economy Distribution Fuseboard with cover open showing shields, and dead-front feature when fuses are removed.



In every branch of electronics

Connollys' fine enamelled winding wires make a big contribution to increased reliability and speedier production. The latest Connollys publications, covering the complete range of winding wires, provide a valuable source of information for the designer and coil winder.

Free copies will be gladly sent on request.

CONNOLLYS WINDING WIRES

Kirkby Industrial Estate,
Liverpool
Tel : Simonswood 2730
Grams : SYLLONNOC,
Liverpool—Telex
Telex : 62-247

Southern Sales Office and Stores
23 Starcross Street, London,
N.W.1.
Telephone : EUston 6122

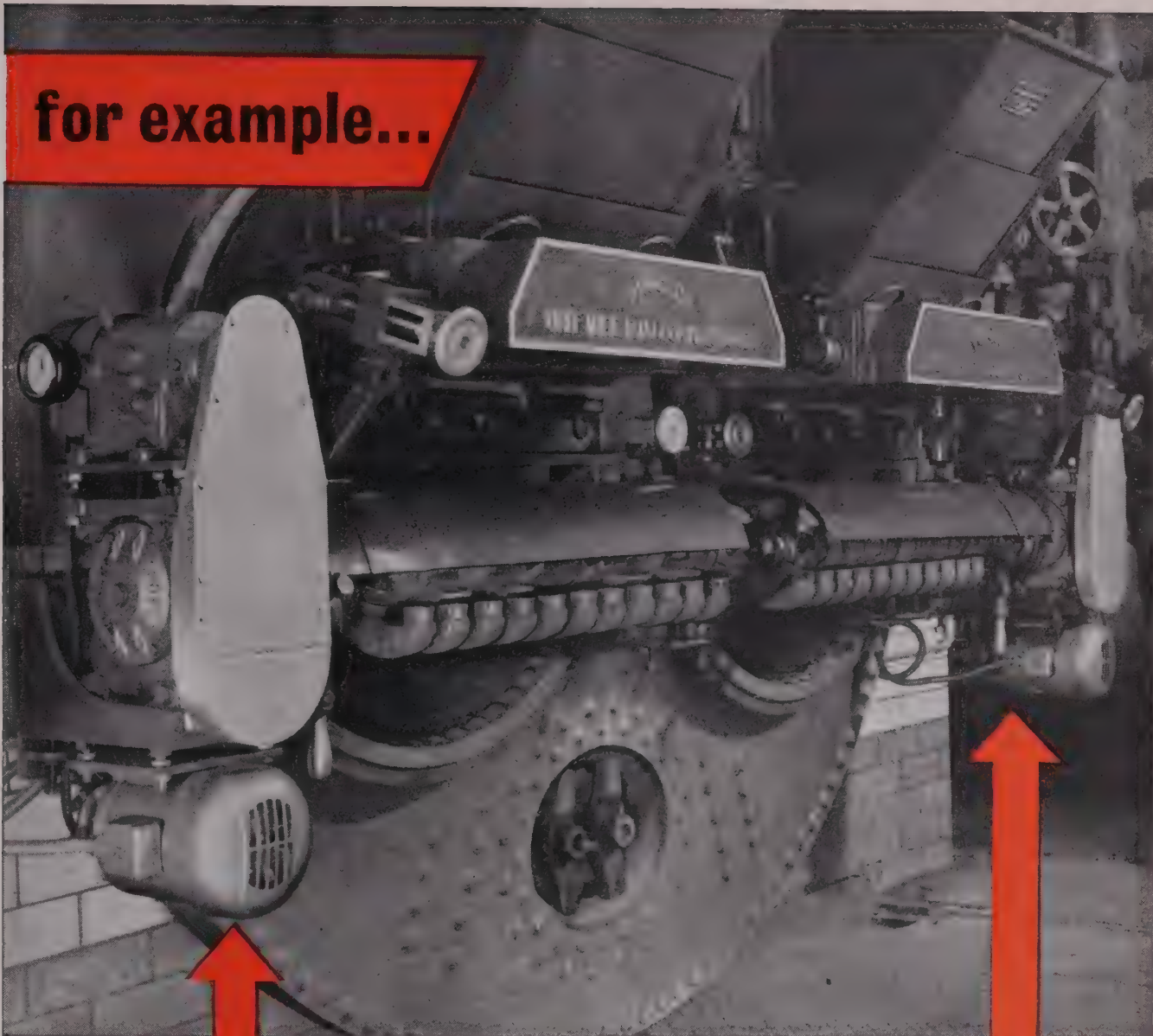
Midland Sales Office and Stores:
39-44 Watery Lane, Bordesley,
Birmingham 9
Telephone : VICtoria 4991
Telex : 33-309

CONNOLLYS (BLACKLEY) LIMITED

*The largest manufacturers of fine
enamelled wire in the world*



for example...



The new Proctor wide-ram coking stoker is powered by an 'ENGLISH ELECTRIC' standard $\frac{3}{4}$ h.p. totally-enclosed, fan-cooled motor.

From 1/20 h.p. upwards there is an 'ENGLISH ELECTRIC' f.h.p. motor for any drive under any conditions. *Details of the full range will be sent on request.*

'ENGLISH ELECTRIC'

f.h.p. motors

THE ENGLISH ELECTRIC COMPANY LIMITED, ENGLISH ELECTRIC HOUSE, STRAND, LONDON, W.C.2

F.H.P. Motors Department, Bradford

WORKS: STAFFORD • PRESTON • RUGBY • BRADFORD • LIVERPOOL • ACCRINGTON

she can't
have one
without
the other

Most people want the comfort of modern amenities—but few like the towers that bring the power to work them. What's the answer? Return to lamplight, peat fires and the washing tub? Bury the power lines and do away with the towers altogether? Attractive idea—just possible too, but at 17 times the cost—with its inevitable effect on your electricity bill. For the foreseeable future, transmission towers must stay. But they cannot be planted just anywhere. An Act of Parliament charges the Central Electricity Generating Board with a double duty: to provide an efficient and economical electricity supply, while preserving visual amenity as far as possible. Power lines are planned with forethought—by men who are as anxious as you are to keep this land green, pleasant... and up-to-date.



■ These advertisements are appearing in the farming and country magazines. The Central Electricity Generating Board thank electrical contractors for their co-operation in the past, and know that they will do all they can to preserve the amenities of the countryside.



who make and supply electricity to 12 Area Electricity Boards in England and Wales (which re-sell to consumers) and British Railways.

Write for a copy of "Preserving Amenities" to The Central Electricity Generating Board, 75 Winsley Street, London, W.1

Regional Guide to

ELECTRICAL CONTRACTORS**LONDON****J. G. SNEATH LTD.**

13 Solebay Street, E.1

Telephone: STEpney Green 4021

Rewinds and Repairs.

Industrial Installations

Motor and Generator Repairs and Rewinds, Lighting and Power Installations. Factory Maintenance Contracts

COLLINS ELECTRICAL LTD.

115 Clerkenwell Road, E.C.1

Telephone: HOLborn 0212-3-4 & CANonbury 3227-8

Lighting, Heating and Power Installations.

Factory Maintenance and

Motor Stockists

C. J. FERGUSON & SONS LTD.

33 Barbican, London, E.C.1

Telephone: MONarch 5474-5

MUMFORD, BAILEY & PRESTON LTD.

147 Farringdon Road, E.C.1

Telephone: TERminus 0647

Electrical, Heating, Air Conditioning, Ventilating and Plumbing Engineers and Contractors

DUNCAN WATSON (ELECTRICAL ENGINEERS) LIMITED

Andrew House, 60 Worship Street, London, E.C.2

Telephone: BISHopsgate 4752

Also at Castle Moat Chambers, Bath Place, Taunton

C. J. BARTLEY & CO. LTD.

Electrical Engineers and Contractors.

7 Laurence Pountney Hill, E.C.4

Telephone: Mincing Lane 2326 (4 lines)

DISPLAY & ENGINEERING SERVICES LTD.

94 & 96 Baylis Road, Waterloo, London, S.E.1

Telephone: WaterloO 5971 or 3177

Commercial Electrical Installations. Specialists in Shop, Showroom and Exhibition Lighting. Factory Maintenance.

THE PHOENIX ELECTRICAL CO. (LONDON) LTD.

Electrical Engineers and Contractors

Head Office: Phoenix House, 16-18 Marshalsea Road, London, S.E.1

Telephone: HOP 4834

Industrial Installations.

Power, Heating and Lighting.

Factory Main-

tenance. Electrical Engineers. Break-down Specialists

F. A. ORRICK & CO. LTD.

157 Camberwell Road, S.E.5

Telephone: RODney 5548

Electrical Engineers and Contractors. Maintenance

WARMSLEY BROS. & CO. LTD.

216 Southampton Way, London, S.E.5

RODney 4153/2129

BARLOW & YOUNG LTD.

55 Catherine Place, Westminster, S.W.1

Telephone: VICtoria 7373

Installations of all Types

Electrical Engineers and Contractors since 1888

BELSHAW & CO. LTD.

351 Brixton Road, S.W.9

Telephone: BRI 0692/3

BERKELEY ELECTRICAL ENG. CO. LTD.

Vincent House, Vincent Square, S.W.1

Telephone: VICtoria 8051

Electrical Engineers and Contractors

Founded 1903

H. J. CASH & CO. LTD.

Caxton House, Tothill St., S.W.1

Whi 4774

Electrical, Heating and Ventilating

Air-Conditioning Engineers

DRAKE & GORHAM (Contractors) LTD.

36 Grosvenor Gardens, Westminster, S.W.1

Telephone: SLOane 0121

Electrical Engineers and Contractors

HOLLIDAY, HALL & STINSON LTD.

Delta House, 222 Balham High Road

London, S.W.12

ELECTRICAL ENGINEERS AND CONTRACTORS

JAMES SCOTT & CO. (ELECTRICAL ENGINEERS) LTD.

20 Grosvenor Place

Argyle Way, Stevenage

London, S.W.1

Herts

Telephone: STEvenage 1933

Britain's Largest Electrical Installation Organisation for all high-class Electrical Installation and Instrumentation

One of the Largest Electrical Contractors in the Industry

ELECTRICAL INSTALLATIONS LTD.

65 Vincent Square, Westminster, S.W.1

Telephone: VICtoria 2266 (10 lines)

... for all electrical installations

F. H. WHEELER & CO. LTD.

39 Victoria Street, S.W.1

Telephone: ABBey 8080 (8 lines)

Electrical Engineers and Contractors for over 50 years

TROUGHTON & YOUNG LTD.

Imperial Court, Basil Street, Knightsbridge, S.W.3

Telephone: KENSington 3444 (20 lines)

BURDETTE & CO. LTD.

150 Clapham Manor Street, S.W.4

Telephone: MACaulay 4555

Industrial Installations. Motor and Generator Repairs. Metallizing Treatments. Complete Electrical Maintenance. Heating and Ventilating

WILSON ELECTRIC (BATTERSEA) LTD.

1-7 Radstock Street, S.W.11

Telephone: BATTERsea 3343 (4 lines)

Electrical Engineers and Contractors. Motor Rewinds and Repairs. Installations. "Delco" Electric Motors—Approved Stockists and Repairers

HIGGINS & CATTLE LTD.

21 Orchard Street, W.1

Telephone: HUNter 1921/5

Electrical Engineers and Contractors

CABLE JOINTERS LTD.

ELECTRICAL ENGINEERS AND CONTRACTORS

229 High Street, London, W.3

Telephone: ACORn 7811

A. A. ELECTRICAL CO. LTD.

67 Rothschild Road, Chiswick Park, W.4

Telephone: CHI. 5185 & 5605

Motor Generator Repairs and Rewinds. Industrial and Crane Installations. Power, Heating and Lighting. Factory Maintenance. Breakdown Specialists. Power Factor Planning. Electrical Plant Stockists.

Industrial Installations throughout the Country. Power, Maintenance and Insurance

CITY ELECTRICAL CO.

Emerald Street, W.C.1

Telephone: HOL. 9722 (6 lines)

Repairs and Rewinds—Motor Stockists

ENGINEERS SINCE 1820

ALLIANCE ELECTRICAL CO. LTD.

2 Henrietta Street, W.C.2

Telephone: COV. 0971

For electrical installations of any kind and size

CHARING CROSS ELECTRICAL INSTALLATION CO. LTD.

61 Chandos Place, Strand, W.C.2

Telephone: TEMple Bar 5188

Lighting, Heating and Power Installations. Electrical Maintenance.

J. H. PLANT LTD.

97/99 St. Martin's Lane, W.C.2

Telephone: TEMple Bar 0611 (5 lines)

Electrical Engineers and Contractors

WILLIAM STEWARD & COMPANY LTD.

154 Albany Street, N.W.1

Telephone: EUSton 3763

Electrical Engineers and Contractors

A. TINDALL & SONS

22 Rosemary Avenue, Enfield

Electrical Engineers and Contractors

Telephone: ENField 6612 (3 lines)

T. A. BOXALL & CO.

53 Victoria Street, S.W.1

Telephone: SULLivan 4103

Electrical Engineers and Contractors

Home and Overseas

F. W. BLANSHARD LTD.

23 Lansdowne Road, Purley, Surrey

Telephone: UPLands 4818, 4819 & 4810

Complete electrical installations. Rewinding and repair of motors and transformers. Manufacturers of control gear for fluorescent

(Continued on page 96)

(Continued from page 95)

SERVICE ELECTRIC CO. LTD.
Secomak Works, Honeypot Lane, Stanmore, Middx.
 Telephone: EDGware 5566-7-8-9
 Electrical Installations of every kind. Motor Rewinds. Factory Maintenance

DYNAMO & MOTOR REPAIRS LTD.
North End Road, Wembley Park
 Telephone: Wembley 3121

Motor and generator repairs and rewinds. Installations and factory maintenance. Electrical plant stockists

Electrical Contractors
CABLE JOINTING & ERECTION CO.
69 Dame Agnes Street, Nottingham
 Telephone: Nottingham 84887
 Cable Jointing. Cable Laying. Keenest Prices.

SOUTH EASTERN

BURBIDGE, CLOUGH SMITH LTD.
32 St. James's Street, Brighton
 Telephone: Brighton 63201-2-3
 Electrical Engineers and Contractors

Electrical, Refrigeration and Radio Engineers. Installation Contractors.
 Lifts. Television

H. BENEY & SONS LTD.
99 South Street, Eastbourne
 Telephones 4820/1 (Day and Night)

For first-class A.C. and D.C. Rewinds and Industrial Plant Maintenance
ELECTRICAL POWER REPAIRS (Gillingham) LTD.
Strover Street, Gillingham, Kent
 Telephone: Gillingham 5200 & 59356 (Day and Night)

HOLLISTER'S (Electrical Contractors) LTD.
 Gravesend Gillingham
 22 Parrock Street 20 Rock Avenue
 Phone: Gravesend 4139 Phone: Gillingham 50629
 Electrical Installations

T. A. BOXALL & CO.
20 Balcombe Road, Horley
 Telephone: Horley 4388
 Electrical Engineers and Contractors Home and Overseas

F. W. BLANSHARD LTD.
23 Lansdowne Road, Purley, Surrey
 Telephone: Uplands 4818, 4819 & 4810
 Complete electrical installations. Rewinding and repair of motors and transformers. Manufacturers of control gear for fluorescents

R. & B. SIMS
28 The Broadway **11 Claremont Road**
New Haw, Weybridge, Surrey **West Byfleet, Surrey**
 Telephone: BYFLEET 2218 Telephone: BYFLEET 45218/43304
 Wiring Installations, Refrigeration Engineers, Lighting Consultants,
 Floor Heating Engineers, Factory Maintenance, etc.

Electrical Contractors for 40 years
HAMILTON COLE (SUSSEX) LTD.
201 Heene Road **Station Road**
Worthing **Pulborough**
 Telephone: Worthing 1961-1887 Telephone: Pulborough 237

SOUTHERN

... for all electrical installations
F. H. WHEELER & CO. LTD.
32 Brassey Road, Winton, Bournemouth
 Telephone: Winton 1609

MUMFORD, BAILEY & PRESTON LTD.
22a, Holdenhurst Road **159 Elm Grove**
Bournemouth, Hants. **Southsea, Hants.**
 Telephone: Bournemouth 23484 Telephone: Portsmouth 24128
 Electrical Heating, Ventilating and Plumbing Engineers and Contractors

Electrical Contractors
THODAY & LONGMAN LTD.
73 High Street, Lymington, Hants
 Telephone: Lymington 3267 (2 lines)

HERBERT & LASCELLES LTD.
 Industrial Electrical Contractors
22-25 St. Mary's Butts, Reading

... for all electrical installations
F. H. WHEELER (Southern) LTD.
Clifton Hall, Oakley Road, Shirley, Southampton
 Telephone 73867 & 76056

GOATER & MEDWAY LTD.
 Electrical Engineers
7 Carlton Place, Southampton
 Telephone 28980

Cable Jointing. Cable Laying. By Direct Contract and to the Trade.

SOUTH WESTERN

... for all electrical installations
F. H. WHEELER (Bristol) LTD.
37 Victoria Street, Bristol 1
 Telephone 26907

N. G. BAILEY & CO. LTD.
 Electrical and Mechanical Contractors
West India House, 54 Baldwin Street, Bristol 1
 Telephone 21586

Also at: Leeds, Ilkley, London, Manchester, Sheffield, Cardiff and Scunthorpe

WESTERN DYNAMO AND MOTOR COMPANY
Summerland Street, Exeter

Telephone 58421/2
 Motor, generator and transformer rewinds. Lighting and power installations.
 Factory maintenance

CLARKE BROS. (Stroud) LTD.
Bath Road, Stroud
 Telephone: Stroud 1132/3
 Electrical Engineers and Contractors
 Rewinds and Repairs. Industrial Installations

EASTERN

FYFE, WILSON & CO. LTD.
Station Works, Bishop's Stortford, Herts.
 Telephone: Bishop's Stortford 1000/1/2

Stockists of Industrial Motors, Alternators, Control Gear, Transformers,
 Diesel and Steam Engines and Generator Sets. Repairs and re-winds.
 Industrial Installations.

Norwich. . . Cambridge. . . Gt. Yarmouth. . . Lowestoft. . . Ipswich

EASTERN & HOME COUNTIES ELECTRICAL CONTRACTORS
 Specialists in Large Scale Electrical Installation Contracts.
Electra House, Southtown Road, Gt. Yarmouth
 Telephone: Gt. Yarm. 2390

ELECTRICAL ENGINEERS & CONTRACTORS
PLAYFORD & SON LTD.
Chantry House, High Street, Newmarket
 Telephone 3353/4 and 2795

EAST MIDLANDS

Electrical Engineers and Contractors
C. A. J. BILLINGTON LTD.
Cranfield, Bedfordshire
 Telephone: Cranfield 293
 Industrial Installation throughout the Home Counties

Electrical Contractors
CABLE JOINTING & ERECTION CO.
69 Dame Agnes Street, Nottingham
 Telephone: Nottingham 84887
 Cable Jointing. Cable Laying. Keenest Prices.

For all types of Electrical Installations
W. J. FURSE & CO. LIMITED
Traffic Street, Nottingham
 Telephone: 83471 (5 lines)
 Electrical Engineering Contracting Specialists

MIDLANDS

WALKER BROS. (ELECTRICAL ENGINEERS) LTD.
Contracts Dept., 12-13 Bath Street, Birmingham 4
 Telephone: Northern 5288
 Electrical Installation Engineers. Industrial Installation Specialists
 Established 1895

HARRIS & SHELDON LTD.
45 College Road, Perry Barr, Birmingham 22
 Telephone: Birchfields 5801
 For all electrical contracting installations, lighting, heating, power, public address, etc.

Electrical and Mechanical Engineers, Factors
THE BIRMINGHAM POWER TRANSMISSIONS LTD.
117/118 Snow Hill, Birmingham 4
 Telephone: AST. 2088-9

... for all electrical installations
F. H. WHEELER & CO. LTD.
553 Moseley Road, Birmingham 12
 Telephone: Calthorpe 2601-2

DYNAMO & MOTOR REPAIRS LTD.
Belgrave Terrace, Soho Road, Birmingham 21
 Telephone: Northern 0898
 Motor and generator repairs and rewinds. Installations and factory maintenance.
 Electrical plant stockists

ELECTRICAL INSTALLATIONS LTD.
Faraday Works, Stoney Stanton Road, Coventry
 Telephone 21076-7-8
 Industrial Electrical Work of All Kinds. Over 50 Years' Experience

(Continued on page 97)

(Continued from page 96)

Electrical Contractors
CABLE JOINTING & ERECTION CO.
 69 Dame Agnes Street, Nottingham
 Telephone: Nottingham 84887
 Cable Jointing. Cable Laying. Keenest Prices.

For all types of Electrical Installations
W. J. FURSE & CO. LIMITED
 Traffic Street, Nottingham
 Telephone: 83471 (5 lines)
 Electrical Engineering Contracting Specialists

Electrical Engineers and Consultants
W. H. TAYLOR (WOLVERHAMPTON) LTD.
 Heantun House, Salop Street
 WOLVERHAMPTON
 Telephone 21687

SOUTH WALES

DRAKE & GORHAM (Contractors) LTD.
 13 St. Andrew's Crescent, Cardiff
 Telephone: Cardiff 32080
 Electrical Engineers and Contractors

... for all electrical installations
F. H. WHEELER & CO. LTD.
 117 Woodville Road, Cardiff

Telephone 21281-2

Telegrams: "Whelect"

N. G. BAILEY & CO. LTD.
 Electrical and Mechanical Contractors
 Andrews Building, 67 Queen Street, Cardiff 1
 Telephone 29639

Also at: Leeds, Ilkley, London, Manchester, Sheffield, Bristol and Scunthorpe

CLARKE BROS. (Stroud) LTD.
 High Street, Merthyr Tydfil
 Telephone: Merthyr Tydfil 3377
 Electrical Engineers and Contractors
 Rewinds and Repairs. Industrial Installations

W. J. FURSE & CO. (MANCHESTER) LTD.
 Royal Buildings, Talbot Road, Port Talbot
 Telephone: Port Talbot 3276
 For Electrical Installations and Contract Work

MERSEYSIDE & N. WALES

Electrical Engineers and Contractors for over 50 years
TROUGHTON & YOUNG LTD.
 46 Rodney Street, Liverpool 1
 Telephone: Royal 9231

HIGGINS & CATTLE LTD.
 322 India Buildings, Water Street, Liverpool 2
 Telephone: Liverpool Central 1729
 Electrical Engineers and Contractors

MUMFORD, BAILEY & PRESTON LTD.
 26 Chapel Street, Liverpool 2
 Telephone: Maritime 1859
 Electrical Heating, Air Conditioning, Ventilating and Plumbing Engineers and Contractors

ELECTRICAL INSTALLATIONS OF ALL TYPES
THE SANDON MOTOR & ENGINEERING COMPANY LIMITED
 1-3 Grundy Street, Liverpool 5
 Telephone: NOR. 2226 (4 lines) Telex 62438

YORKSHIRE

Electrical Engineers and Contractors
SOUTHERN & REDFERN LTD.
 Woodhead Road, Bradford 7
 Textile Maintenance, Repairs and Rewinds
 Telephones: Bradford 23871—Late Phone: Bradford 65837

... for all electrical installations
F. H. WHEELER & CO. LTD.
 44 Bank Street, Sheffield 1

Telephone 24015 (3 lines)

Telegrams: "Whelect"

N. G. BAILEY & CO. LTD.
 Electrical and Mechanical Contractors
 10 Sharrow Lane, Sheffield 11
 Telephone 53328

Also at: Leeds, Ilkley, London, Manchester, Cardiff, Bristol and Scunthorpe

Electrical Contractors
CABLE JOINTING & ERECTION CO.
 69 Dame Agnes Street, Nottingham
 Telephone: Nottingham 84887
 Cable Jointing. Cable Laying. Keenest Prices.

HOLLIDAY (ELECTRICAL) LTD.
 Delta House, 222 Balham High Road
 London, S.W.12

ELECTRICAL ENGINEERS AND CONTRACTORS

NORTH-WESTERN

ANGLO-AMERICAN ELECTRICAL COMPANY
 Olive St., Bury, Lancs.
 Telephone: Bolton 27251

Electrical Installations: Power, Heating, Lighting.
 Manufacturers of Fluorescent Fittings, Ballast Units, etc.

DRAKE & GORHAM (Contractors) LTD.
 21 Newton Street, Piccadilly, Manchester 1
 Telephone: Manchester Central 4701
 Electrical Engineers and Contractors

... for all electrical installations
F. H. WHEELER & CO. LTD.
 Regal Buildings, Oxford Road, Manchester 1
 Telephone: Central 8207-8

Industrial Installations
W. H. SMITH & CO. ELECTRICAL ENGINEERS LTD.
 Contracting Manufacturing Electronic Maintenance
 12 York Street, Manchester 2 Shepley Estate, Audenshaw Grosvenor Street, Manchester
 Central 2991-8 DENton 3961 ARDwick 5011

W. J. FURSE & CO. (MANCHESTER) LTD.
 20 Mount Street, Manchester 2
 Telephone: Blackfriars 5014-5-6

For Electrical Installations and Contract Work

JAMES SCOTT & CO. (ELECTRICAL ENGINEERS) LTD.
 Bermuda House, 4/6 Hall Street, Manchester 2
 Telephone: Manchester Central 3571
 Britain's largest Electrical Installation Organisation for all high-class Electrical Installation and Instrumentation

NORTH-EASTERN

COX-WALKERS LTD.
 North Eastern Electric Works, Feethams, Darlington
 Electrical Contractors of repute since 1880. Motor Rewinds and Manufacturing Engineers
 Telephone: 66277/8

Engineers and Contractors
CITY ELECTRICAL CO.
 Turks Head Yard, Cecil Street, Lincoln
 Telephone: Lincoln 124 London: HOLborn 9722

NORTH OF ENGLAND ENGINEERING & ELECTRICAL CO. LTD.
 Ferryhill 86 Ryhope Rd. Palladium Buildings
 Co. Durham Sunderland Middlesbrough
 Tel: 435/6 Tel: 58762 Tel: 88156
 ELECTRICAL INSTALLATION CONTRACTORS

JAMES SCOTT & CO. (ELECTRICAL ENGINEERS) LTD.
 Argyle House, Argyle Street, Newcastle-upon-Tyne 1
 Telephone: 28605
 Britain's Largest Electrical Installation Organisation for all high-class Electrical Installations and Instrumentations

... for all electrical installations
F. H. WHEELER & CO. LTD.
 52 Elswick Road, Newcastle
 Telephone: Newcastle 36271

SOUTH-WEST SCOTLAND

JAMES SCOTT & CO. (ELECTRICAL ENGINEERS) LTD
 80/110 Finnieston Street 21/25 George IV Bridge
 Glasgow, C.3 Edinburgh
 Telephone: Central 3866 Telephone: Central 6424
 Britain's Largest Electrical Installation Organisation for all high-class Electrical Installation and Instrumentation

REPUBLIC OF IRELAND

Electrical Engineering Contractors
A. G. BRUTY LIMITED
 38 Dawson Street, Dublin
 Telephone: Dublin 73181

Applications for particulars of costs and standard style of
 advertisements in this Regional Guide should be
 addressed to:

THE
 ADVERTISEMENT DEPARTMENT
 ELECTRICAL REVIEW
 DORSET HOUSE STAMFORD STREET
 LONDON S.E.1



ELLIOTT

REFLECTING DYNAMOMETER INSTRUMENTS

Low measurement loss,
precision instruments of extreme sensitivity.

Ideal for measurement in low power
circuits in the frequency range 0—2500 c/s.

Write for Publication PT13A

Electrical Measurement Division

ELLIOTT BROTHERS (LONDON) LTD

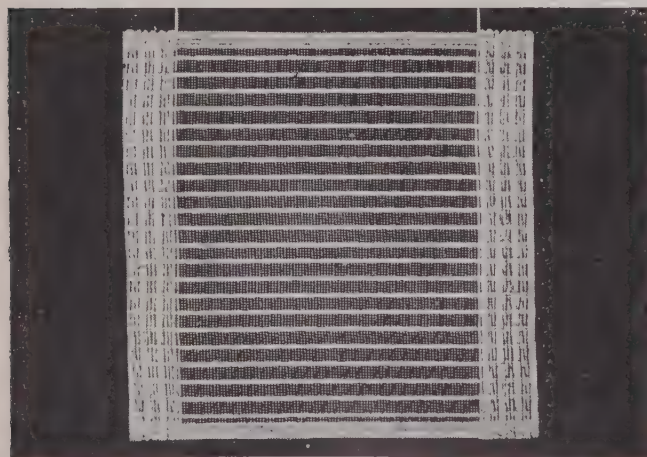
Century Works · London · SE13

Telephone Tideway 1271

EA A member of the Elliott-Automation group

END

expamet **cressall** ASBESTOS WOVEN NETS



Wire or flat tape asbestos woven grids and nets in a wide range of dimensions and resistance values. Supplied singly or in banks.

expamet **cressall**

THE ELECTRICAL DIVISION OF THE EXPANDED METAL COMPANY LTD.

London Office: 16 Caxton Street, S.W.1. Telephone ABBey 7766

Works: Stranton Works, West Hartlepool

Enquiries to:

The Cressall Manufacturing Company Ltd, 51 Cheston Road, Birmingham 7

Telephone East 3571

A valuable book for Electrical and Electronic Engineers **LAPLACE TRANSFORMS FOR ELECTRICAL ENGINEERS**

By B. J. Starkey, DIPL. ING., A.M.I.E.E.

A presentation of the theory of Laplace transformation in which a physical vocabulary rather than a purely mathematical one is used as far as possible. This method of analysis has become of increasing importance to electrical engineers in many fields, and the work is designed to provide a thorough treatment of the subject in a language with which they will be familiar. Published for "Wireless Engineer."

30s. net. BY POST 31s. 2d.

From booksellers. Published by:

ILIFFE Books Ltd Dorset House Stamford St London SE1

Classified Advertisements

CLASSIFIED advertisements are PREPAID at 4/- per line (approx. 6 words).

DISPLAYED CLASSIFIED:—53/- per single column inch.

Where an advertisement includes a Box Number there is an additional charge of 1/-.

SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

Remittances payable to "ELECTRICAL REVIEW."

REPLIES TO BOX NUMBERS should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1. If an applicant for a situation appearing under a Box Number does not wish his reply to be forwarded to a particular firm or individual, instructions to this effect should be addressed to the Advertisement Supervisor, ELECTRICAL REVIEW. The name of an advertiser using a Box Number cannot be disclosed.

OFFICIAL NOTICES, TENDERS, ETC.

INDIA STORE DEPARTMENT

THE office of the India Supply Mission, 2536, Massachusetts Avenue, N.W., Washington, 8, D.C., United States of America, invites tenders for the following:—

(a) TENDER ENQUIRY No. SE. 386.

For the supply of 3,150 and 415-Volts Metal Clad Switchgear. Required by Damodar Valley Corporation for the Chandrapura Thermal Power Station.

(b) TENDER ENQUIRY No. SE. 326.

For the supply of Nineteen Cranes comprising: Slewable, Non-Slewable Crawler Mounted, Lifting and travelling with load and Forklift. Required by Neyveli Lignite Corporation Ltd., India.

Specifications, etc., relative to the above enquiries can be obtained from the Co-ordination Branch, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, at a cost of (a) £1 1s. 6d. per tender set, (b) 14 shillings 4 pence per tender set. The cost of the tender documents is not refundable, and the forms are not transferable. Tenders are to be returned direct to India Supply Mission, at the above address and not to this office, so as to reach them by (a) 18th August, 1961, (b) 21st August, 1961.

Specimen copy of the above enquiries can be seen at India Store Department, Engineering Branch, Bromyard Avenue, Acton, London, W.3, under the following reference numbers (a) S. 3063/61/NSC/ENG.2, (b) S. 4171/60/NSC/ENG.2. 1566

BOROUGH OF ILFORD

Removal of Trolley Bus Poles

TENDERS are invited for the removal of approximately 424 No. Ex London Transport Executive trolley bus poles.

Forms of tender may be obtained from the Borough Engineer, Town Hall, Ilford, on payment of £2 2s. deposit, which will be returned upon receipt of a bona fide tender not subsequently withdrawn.

Tenders in a plain sealed envelope, bearing no name or mark indicating the tenderer and endorsed "Tender for Removal of Trolley Bus Poles" must be delivered to the Town Clerk, Town Hall, Ilford, not later than 4 p.m. on 25th July, 1961.

The Council does not bind itself to accept the lowest or any tender. 1608

BOROUGH OF NEWBURY

Group "B" Electric Street Lighting Scheme

TENDERS are invited for the supply and erection of 713 Lanterns, 697 Steel and Concrete Columns and 16 Wall Brackets, together with Lamps, Wiring and Control Gear.

Form of tender, specification and bill of quantities may be obtained from the Borough Surveyor, Municipal Buildings, at whose office plans and general conditions may be inspected.

Sealed tenders endorsed "Tender for Group "B" Lighting" must be delivered to the undersigned not later than Thursday, 27th July, 1961. The Corporation does not bind itself to accept the lowest or any tender.

LESLIE SOUTHERN,
Town Clerk.
1590

BOROUGH OF LUTON

TENDERS invited for erection and wiring only of 720 No. Class "B" concrete lighting columns.

Documents from Borough Engineer, Town Hall, Luton, on payment of £2 2s. deposit, returnable after receipt of bona fide tender not subsequently withdrawn. Cheques payable "Luton Corporation."

Tenders to Town Clerk, Town Hall, Luton, by first post on Monday, 17th July, 1961. 1589

SITUATIONS VACANT

(See "Replies to Box Numbers" above)

CENTRAL ELECTRICITY GENERATING BOARD

South Thames Division

Electrical Engineer's Department,
Croydon District

FOURTH ASSISTANT ENGINEER (Services)

(Vacancy No. 189/61).

Candidates must possess Higher National Certificate in Electrical Engineering or equivalent qualification, and be interested in automatic protective gear and control gear associated with major electrical plant in power stations and substations.

Salary N.J.B. Grade 11, £940 to £1,215 per annum including London allowance.

Applications giving age, details of experience, qualifications, etc., should be sent to the Personnel Officer, Central Electricity House, Lower Ham Road, Kingston-upon-Thames, Surrey, to arrive by 12th July. 1616

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

Vacancy No. 220/ER/61

APPLICATIONS are invited for the appointment of ASSISTANT SHIFT CONTROL ENGINEER at Uskmouth "A" and "B" Power Stations, West Nash, nr. Newport, Mon.

Salary Schedule A, Class M, Grade 12, Scale 9, £1,115-£1,245 plus 10% shift allowance.

Applicants should possess H.N.C. or equivalent qualifications, and have had experience in a modern power station.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 17th July, 1961. 1622

Advertisements are accepted up to first post on Monday of the week of issue

If blocks, bold type or ruled borders are required then on Friday prior to week of issue

All communications to be addressed to:
Classified Advertisement Department,
ELECTRICAL REVIEW
Dorset House, Stamford Street
London, S.E.1

Original testimonials should not be sent with applications for employment

MECHANICAL AND ELECTRICAL ENGINEERS

War Department Works Organisation

THIS new civilian organisation, concerned with major works projects at home and overseas, offers 25 pensionable posts to ENGINEERS (men) who have achieved Corporate Membership of Institution of Civil, Mechanical or Electrical Engineers or have qualified by examination for such membership. High professional attainment may be accepted in lieu of such qualifications.

1 Superintending Grade post, £2,710 (or more) to £3,060.

4 Senior Grade posts, £2,140 (or more) to £2,452.

14 Main Grade posts, £1,506 (or more) to £2,010.

6 Basic Grade posts between £976 (age 25) and £1,308 (or more over age 34) to £1,480.

Outer London salaries quoted. Promotion prospects. Local government, etc., superannuation may be transferred.

Write Civil Service Commission, 17, North Audley Street, London, W.1, for full particulars and an application form, quoting S/5331/61. Closing date, 9th August, 1961. 1593

CENTRAL ELECTRICITY GENERATING BOARD

APPLICATIONS are invited for the following superannuable post. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

ASSISTANT ENGINEER (Electrical Test),
FULHAM POWER STATION
(Vacancy No. 61/398).

Sound technical training and knowledge of testing and routine maintenance of power station electrical equipment, including generators, switchgear, transformers, motors and protective equipment.

Salary Class K, Grade 15 = £815-£920 per annum.

Applications, quoting vacancy number, may be made to (or on form from) Personnel Department, Central Electricity Generating Board, P.O. Box No. 136, London, W.1, to be received not later than 18th July, 1961. 1579

A DEPUTY MANAGING ENGINEER

is required to attend to Services and Installations in a Modern Textile Unit of medium size, where the Personal touch is still of value.

Electrics are important; Planning and Estimating experience is essential; a knowledge of Air Conditioning is desirable.

Applicants should be able to justify a Senior Staff salary of not less than £1,500 p.a., and may write in confidence to

A. S. Orr & Co. Ltd.

School Lane, Bamber Bridge, nr. Preston, Lancs.

1571

Situations Vacant (continued)**CENTRAL ELECTRICITY
GENERATING BOARD****South Eastern Region
North Thames Division**

APPPLICATIONS are invited for the following appointments:—

STATION SHIFT CONTROL/BOILER**SHIFT CONTROL ENGINEER,
PETERBOROUGH GENERATING****STATION (Northants) (S.V. No. 1519).**

Salary N.J.B. Class F, Grade 10, Scale 5, £825-£940 per annum, plus 10% shift allowance.

Applicants should have reached the standard of the Ordinary National Certificate in Electrical Engineering, or its equivalent, and had experience in the operation of a switchboard at a generating station and be fully conversant with high voltage switching operations and protective systems. Experience in the operation of pulverised fuel fired steam raising plant will be an advantage.

The successful applicant will be required to interchange the duties of Station Shift Control Engineer and Boiler Shift Control Engineer.

**GENERAL ASSISTANT ENGINEERS,
GOLDINGTON GENERATING****STATION (Bedford) (S.V. No. 1520)**

and

**GENERAL ASSISTANT ENGINEER,
PETERBOROUGH GENERATING****STATION (Northants) (S.V. No. 1521).**

Salaries N.J.B. within the range of £625-£805 per annum, plus £90 per annum shift allowance whilst engaged on shift duties.

The commencing salaries will depend upon the duties and responsibilities.

Duties of the above post include assisting in the electrical control room and experience in the technical operation of electrical boiler house, and turbine house plant, testing, etc., in a generating station and provide a suitable basis for promotion to higher technical grades.

Manual workers in skilled grades with suitable technical training will be considered. Previous experience in a generating station and/or technical training to the standard of Ordinary National Certificate or its equivalent will be of advantage.

SHIFT CHARGE ENGINEER,**WATFORD GENERATING STATION
(Herts) (S.V. No. 1522).**

Salary N.J.B. Class E, Grade 7, Scale 7, £965-£1,090, plus London weighting £50 per annum, plus 10% shift allowance.

Applicants should possess experience in the operation of steam generating stations. An apprenticeship and technical qualifications to Ordinary National Certificate standard in electrical or mechanical engineering will be advantageous.

Applications, quoting the appropriate Reference S.V. Number, stating age, qualifications, experience and present position should be sent to the Personnel Officer, Central Electricity Generating Board, South Eastern Region, North Thames Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts, to arrive not later than 15th July, 1961. 1596

**CENTRAL ELECTRICITY
GENERATING BOARD****South Eastern Region
North Thames Division**

APPPLICATIONS are invited for the following appointment in the Generation Department (Construction Section) at Cockfosters (N. London).

**DRAUGHTSMAN
(S.V. No. 1517)**

Salary N.J.B. Class AX, Grade 14, Scale 4, £735-£920 per annum (inclusive of London weighting).

The duties of the successful applicant will include the preparation of drawings under supervision of mechanical and electrical works associated with high voltage transmission lines and substations.

Applications, quoting reference S.V. No. 1517, stating age, qualifications, experience and present position, should be sent to the Personnel Officer, Central Electricity Generating Board, South Eastern Region, North Thames Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts, to arrive not later than the 15th July, 1961. 1595

‘ENGLISH ELECTRIC’**WHETSTONE****NR. LEICESTER****ATOMIC POWER DIVISION***INVITE APPLICATIONS FOR A VACANCY FOR A***SENIOR ELECTRICAL ENGINEER**

who will be required to supervise and contribute to:

- (a) Power station auxiliary system design and the specification of transformers, switchgear, cables, etc.
- (b) The design of cable installations.

- (c) The design of lighting and small power installations.

Professional qualifications and experience in these or allied fields is essential for this appointment.

ELECTRICAL ENGINEERS

Vacancies also exist for an engineer and assistant engineer to work on particular aspects of the above. Minimum qualification of H.N.C. or equivalent is required. Previous experience in one of these fields would be advantageous but is not essential.

Assistance will be given with initial accommodation. Applications (which will be treated in confidence) should give details of past experience, age and qualifications, and be addressed to the Chief Engineer, c/o Dept. G.P.S., English Electric House, Strand, London, W.C.2, quoting reference ER1818H.

1561

**RHODESIA AND NYASALAND
FEDERAL POWER BOARD****Operations Department Vacancy
Control Centre Engineer**

APPPLICATIONS are invited for the above appointment at the Board's System Control Centre situated at Sherwood about 17 miles north of Que Que, Southern Rhodesia. The interconnected system to be controlled consists of 900 miles of 330 kV transmission connecting certain existing thermal stations with the Kariba Hydro-Electric Station. Total interconnected generating capacity is over 1,000 MW.

Applicants should have had experience in the operation of an interconnected high voltage system and preferably experience in power station operation. Qualifications leading to Associate Membership of the Institution of Electrical Engineers are desirable. The successful candidate will be responsible for the operation of the Board's interconnected system, including switching, load dispatching and associated duties. The salary for this appointment will be within the range £1,800 × £75 to £2,025 per annum, plus 10% shift allowance depending on qualifications and experience.

The successful candidate will be required to contribute to the Board's pension fund and to join the medical aid fund, and he will be provided with a three-bedroomed house and hard furniture at a low rental at Que Que where there is a full range of Government Schools. Transport between Que Que and Sherwood is provided by the Board.

The reasonable travelling and removal expenses of the successful candidate and his family to Que Que will be paid by the Board.

Applications giving name, age, marital status and full details of education, training, experience and qualifications should be posted to reach the Secretary, Federal Power Board, P.O. Box 630, Salisbury, Southern Rhodesia, not later than 29th July, 1961.

Full details of current cost-of-living, local taxation and climatic conditions are available from the Office of the High Commissioner of Rhodesia and Nyasaland, Rhodesia House, 429, Strand, London, W.C.2. 1563

**CITY OF CARDIFF
EDUCATION COMMITTEE****Llandaff Technical College**

Principal: J. Cotterell, M.I.E.E., A.I.Mech.E.,
A.M.I.Prod.E.

Department of Electrical Engineering

APPPLICATIONS are invited for the post of LECTURER in the Department of Electrical Engineering to commence on 1st September, 1961, or as soon as possible thereafter. The Department provides full-time, sandwich, block release, part-time day and evening courses for Ordinary National Certificate, electrical technicians, electrical installation, radio and television servicing, electronic servicing and servicing for other departments. The successful candidate will be required to teach electrical engineering subjects in these courses and it would be an advantage if he had experience in the light current field.

Salary in accordance with Burnham Technical Scale for Lecturers, £1,370 × £35 (4) + £40 to £1,550 (at present under review).

Further particulars and application forms can be obtained from the undersigned and should be returned within 14 days of the appearance of this advertisement. Previous applicants will be reconsidered and need not re-apply.

ROBERT E. PRESSWOOD,
Director of Education.

City Hall, Cardiff.

1587

**ELECTRICAL ENGINEER
(NORTH LIVERPOOL AREA)**

for development and production work in electro/mechanical mechanisms. Knowledge of small commutator motors essential.

State age and experience (in full), also salary expected, to—Box T.896, Lee & Nightingale, Liverpool, 2.

1488

**CENTRAL ELECTRICITY
GENERATING BOARD****East Midlands Division**

**SENIOR CIVIL ENGINEERING AND
BUILDING DRAUGHTSMAN,
FOURTH ASSISTANT ENGINEER,
DRAWING OFFICE,
DIVISIONAL HEADQUARTERS**
(Vacancy No. 148/61).

Applications are invited for the position of Senior Civil Engineering and Building Draughtsman (Fourth Assistant Engineer) in the Drawing Office at this Divisional Headquarters.

Applicants for this appointment should be experienced and qualified draughtsmen, fully conversant with the design and detailing of civil and building works, including R.C. structures and foundations. A knowledge of structural steelwork will be an advantage.

The work is associated with H.V. substations and generating stations.

Salary will be in accordance with Class BX, Grade 9 (£1,005-£1,325 per annum) of Schedule B of the National Joint Board Agreement.

Closing date for receipt of applications, 15th July, 1961.

**CIVIL ENGINEERING AND
BUILDING DRAUGHTSMAN,
FOURTH ASSISTANT ENGINEER,
DRAWING OFFICE,
DIVISIONAL HEADQUARTERS**
(Vacancy No. 149/61).

Applications are invited for the position of Civil Engineering and Building Draughtsman (Fourth Assistant Engineer) in the Drawing Office at this Divisional Headquarters.

Applicants for this appointment should be draughtsmen, experienced in the design and detailing of civil and building works, including R.C. structures and foundations.

The work is associated with H.V. substations and generating stations.

Salary will be in accordance with Class BX, Grade 11 (£855-£1,165 per annum) of Schedule B of the National Joint Board Agreement.

Closing date for receipt of applications, 15th July, 1961.

These appointments will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Divisional Administrative Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham.

**ASSISTANT SHIFT CHARGE ENGINEER,
LINCOLN POWER STATION**
(Vacancy No. 154/61).

Applications are invited for the position of Assistant Shift Charge Engineer at Lincoln Power Station, Spa Road, Lincoln.

Applicants should have had a sound technical training and experience in a modern power station. Preference will be given to candidates who possess the Higher National Certificate or its equivalent.

Salary will be in accordance with Class F, Grade 9 (£890-£1,015 per annum) of the National Joint Board Agreement, plus allowance for shift duties.

Closing date for receipt of applications, 15th July, 1961.

**ASSISTANT PLANNING ENGINEER,
WILLINGTON "A" AND "B"
POWER STATIONS**
(Vacancy No. 151/61).

Applications are invited for the position of Assistant Planning Engineer at Willington "A" and "B" Power Stations, P.O. Box No. 27, Derby.

Applicants should have held a position of responsibility in a modern power station and should have received a thorough practical and theoretical training.

Preference will be given to candidates who are Corporate Members of a recognised professional institution or who hold qualifications leading to such membership.

Salary will be in accordance with Class M, Grade 8 (£1,440-£1,610 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 15th July, 1961.

These appointments will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Station Superintendent concerned and should be returned to him by the date stated.

O. S. WOODS,
Divisional Controller.
1610

**SOUTH OF SCOTLAND
ELECTRICITY BOARD****Fife Area****General Assistant Engineer**

APPPLICATIONS are invited for appointment as GENERAL ASSISTANT ENGINEER in the Construction Department, East Port, Dunfermline.

Applicants should have a sound experience of all types of overhead construction and be able to carry out surveys.

N.J.B. conditions and salary, Class J, Grade 14 (Scale 4), £765/£870 per annum; post superannuable subject to satisfactory evidence of health.

Applications on the standard form, obtainable from the Area Manager, South of Scotland Electricity Board, East Port, Dunfermline, should be returned to him not later than Saturday, 22nd July, 1961.

East Port,
Dunfermline.
29th June, 1961. 1604

**CENTRAL ELECTRICITY
GENERATING BOARD****South Western Division**

THIRD ASSISTANT ENGINEER required in the Taunton District of the Divisional Electrical Department (Vacancy Notice ER/AV/66/61).

Superannuation scheme. Salary N.J.B. Class AX, Grade 8, Scale 10, £1,130-£1,325 per annum.

Applicants should have had a wide experience in the maintenance of 132-kV and 275-kV overhead lines and substations and be familiar with the work associated with the commissioning of new plant. An interest and some experience in the maintenance and commissioning of protective gear would be an advantage.

Qualifications leading to associate membership of an appropriate engineering institution would be an advantage.

Closing date 17th July, 1961.

ASSISTANT SHIFT CHARGE ENGINEER required at Hayle Power Station, Cornwall (Vacancy Notice ER/AV/67/61).

Superannuation scheme. Salary N.J.B. Class F, Grade 9, Scale 6, £890-£1,015 per annum plus 10% shift allowance (minimum £90).

Applicants should possess good technical qualifications and have had training and experience in the control and operation of modern steam generating plant and main switchgear.

Closing date 15th July, 1961.

Applications on form A.E.6/ACT, obtainable from the Divisional Secretary, 26, Oakfield Road, Bristol, 8, should be completed and returned to him. 1625

PILKINGTON BROTHERS LIMITED

require an

ELECTRICAL ENGINEER

to take charge of research and development in one of the most modern and best equipped high voltage laboratories in the country, co-ordinating the work of existing sections and initiating further projects.

Work at present being undertaken includes research into the dielectric properties of toughened glass high voltage insulators, development of insulators for extra high voltage applications, both A.C. and D.C., investigation into the radio interference from insulators and high voltage transmission lines, and studies of the performance of high voltage insulators in natural and artificial atmospheres.

This post is particularly suitable for a graduate electrical engineer who has recently completed, or is about to complete, a period of research training and is prepared to apply creative thought and imagination in the broader industrial field. Qualified staff are available to carry out routine tests and measurements.

Removal expenses will be paid, there is generous assistance with house purchase and children's education. There are excellent recreational facilities, superannuation and widows' funds. Salaries are competitive and progressive. There are further opportunities of continuing research engineering or of transferring to maintenance or production departments.

Applications should be addressed to the
Personnel Officer (Graduate Recruitment)

PILKINGTON BROTHERS LIMITED, St. Helens, Lancashire

1577

**NORTH OF SCOTLAND
HYDRO-ELECTRIC BOARD****Northern Area****Vacancy for First Assistant District Engineer**

APPPLICATIONS are invited for the post of FIRST ASSISTANT DISTRICT ENGINEER in the Lewis District.

The District Office is in Stornoway where the successful candidate is required to operate.

The District is predominantly rural, embracing the Islands in the Outer Hebrides, and the post provides work of an interesting and varied nature which at times necessitates travel by sea and air.

Applicants should have experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution networks, substation plant and ancillary apparatus.

Minimum technical qualifications: Ordinary National Certificate in electrical engineering. Superannuation scheme applicable.

Salary N.J.B. Class C, Grade 5, £965-£1,090.

Application forms obtainable from Area Manager, Church Street, Dingwall, should be returned completed by 10th July, 1961.

Area Manager.
1572

**CENTRAL ELECTRICITY
GENERATING BOARD****Southern Project Group****Hinkley Point Nuclear Power Station**

APPPLICATIONS are invited from suitably qualified engineers for the post of THIRD ASSISTANT ENGINEER (Mechanical) at Hinkley Point Nuclear Power Station Construction Site.

The successful candidate will be required to assist the Site Mechanical Engineer in the supervision of the installation and testing of mechanical engineering plant, conventional and nuclear.

The salary will be within Scale 13 of the National Joint Board Agreement, i.e. £1,320-£1,610 per annum, according to qualifications and experience.

Applications stating age, qualifications, experience, present position and salary, should be forwarded to the Administrative Officer, Central Electricity Generating Board, Southern Project Group, Squires Lane, Finchley, London, N.3, to arrive not later than 19th July, 1961.

Envelopes should be marked "Confidential, Ref. S/61/13."

T. YULE,
Chief Project Engineer.

1594

Situations Vacant (continued)**SOUTH WESTERN ELECTRICITY BOARD****THIRD ASSISTANT ENGINEER**

(Production and Control),
SOMERSET GROUP (Taunton).

Salary within Class J, Grade 9, Salary Scale 9, £1,115 to £1,245 per annum of Schedule A of the N.J.B. Agreement.

Applicants should have experience of relay and protection testing, network grading, commissioning and routine testing of 33 kV substations, fault level calculations and fault localising and 33 kV system control.

The successful candidate will be required to undertake standby duties.

The possession of the Higher National Certificate in Electrical Engineering or its equivalent is desirable.

Applications for this post to be made on standard form AE6/ACT OBTAINABLE BY POSTCARD ONLY from the Group Administrative Officer, South Western Electricity Board, Priorswood Road, Taunton. Closing date for receipt of completed applications is 22nd July, 1961.

THIRD ASSISTANT ENGINEER (Planning), SOMERSET GROUP (Taunton).

Salary within Class J, Grade 10, Salary Scale 8, £1,040 to £1,165 per annum of the N.J.B. Agreement.

The successful candidate will be required to assist generally in the Group Engineering Department, including assistance with the planning, preparation and examination of schemes for reinforcement of and extensions to the overhead and underground network up to and including 33 kV.

The possession of the Higher National Certificate in Electrical Engineering or its equivalent is desirable.

Applications to be made on standard form AE6/ACT OBTAINABLE BY POSTCARD ONLY from the Group Administrative Officer, South Western Electricity Board, Priorswood Road, Taunton. Closing date for receipt of completed applications is 22nd July, 1961.

THIRD ASSISTANT DISTRICT ENGINEER, TAUNTON, Outposted at Bridgwater.

Salary within Class H, Grade 9, Salary Scale 8, £1,040 to £1,165 per annum of the N.J.B. Agreement.

The successful candidate will be outposted at Bridgwater and will be responsible for the supervision of construction works both underground and overhead up to and including 33 kV and the installation of equipment in substations under the outposted Engineer in Charge at

Bridgwater. The candidate appointed will be required to undertake standby duties on a rota basis. Duties will normally be in the Bridgwater area, but the successful candidate may be required to work anywhere within the Taunton District.

The possession of the Higher National Certificate in Electrical Engineering or its equivalent is desirable and the ability to drive a car will be an advantage.

Applications to be made on standard form AE6/ACT OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, The Parade, Taunton. Closing date for receipt of completed applications is 22nd July, 1961.

GENERAL ASSISTANT DISTRICT ENGINEERS (Drawing Office) (2), Bristol.

Salary within Class K, Grade 13, Salary Scale 6, £890 to £1,015 per annum of the N.J.B. Agreement.

Applicants should have experience in a distribution drawing office and be able to undertake, under supervision, duties which include estimating distribution schemes, and preparation of associated drawings, and system networks and diagrams.

Candidates should possess the Ordinary National Certificate in Electrical Engineering.

Applications to be made on standard form AE6/ACT OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, Electricity House, Colston Avenue, Bristol 1. Closing date for receipt of completed applications is 22nd July, 1961.

DEMONSTRATOR, PLYMOUTH DISTRICT.

Salary within Grade 1, £600 to £700 per annum of the N.J.C. Agreement.

Duties will include the demonstration of cooking and other electrical apparatus in service centres, and consumers' premises, and advising on the selection and use of such apparatus. The successful candidate will also be required to undertake duties with exhibitions, shows, etc., including evening demonstrations for women's institutes and similar organisations.

Candidates should be of good general education, have some experience of public speaking and should hold a recognised domestic science qualification with preferably the E.A.W. Electrical Housecraft Certificate. Possession of a current driving licence will be an advantage.

Applications to be made on standard form AE6/ACT OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, Elliott Road, Prince Rock, Plymouth. Closing date for receipt of completed applications is 22nd July, 1961. 1614



**MIDLANDS
ELECTRICITY
BOARD**

APPLICATIONS are invited for the following superannuable posts:—

**Central Gloucestershire Area
SECOND ASSISTANT DISTRICT
COMMERCIAL ENGINEER
(Dean Forest).**

The successful applicant will be required for duties in connection with the contracting and consumers' service section. Candidates should have had experience in estimating for all classes of electrical installation work, the preparation of tenders and specifications. A sound knowledge of installation practice, refrigeration and electrical apparatus repairs, with good commercial ability is necessary. Technical qualifications desirable. Salary £890/£1,015 per annum (N.J.B. Grade E.8).

Apply by letter, within 14 days, stating age, experience, present position and salary to Mr. S. Raybould, Area Manager, Midlands Electricity Board, Eastern Avenue, Gloucester.

**Worcestershire Area
THIRD ASSISTANT DISTRICT
ENGINEER (Worcester and Malvern).**

Experience necessary in all branches of distribution work including construction, maintenance and operation of high and low voltage underground and overhead systems and substations. Technical qualifications desirable. Salary £890/£1,015 per annum (N.J.B. Grade F.9).

Apply by letter, within 14 days, stating age, experience, present position and salary to District Manager, Midlands Electricity Board, P.O. Box No. 16, Blackpole Road, Worcester.

F. W. CATER,
Secretary.
1599

**NATIONAL INSTITUTE FOR
RESEARCH IN DAIRYING
(University of Reading)****Services Engineer**

APPLICATIONS are invited for the post of SERVICES ENGINEER, for appointment in August or September next. Experience with oil-fired steam boilers, diesel-alternators and the distribution of electricity, steam, water and other services is essential. Applicants must also have experience of planning electrical, heating and ventilating installations including the preparation of specifications for tender. The Services Engineer is responsible to the Head of the Engineering department and will have control of approximately 20 staff.

The appointment will be made in Grade II of the Technical Works Scale (£961-£1,128), with prospects of promotion to Grade I. The post is superannuated.

Apply, giving full details of education, qualifications, experience and present appointment to Secretary, N.I.R.D., Shinfield, Reading, quoting reference 61/21. 1567

**CENTRAL ELECTRICITY
GENERATING BOARD**

**South Wales Division
Vacancy No. 219/ER/61**

APPLICATIONS invited for the superannuable N.J.B. appointment of STATION SHIFT CONTROL ENGINEER, Tir John Power Station, Port Tennant, Swansea.

Salary Schedule A, Class H, Grade 10, Scale 7, £965-£1,090 per annum, plus 10% shift enhancement.

Applicants should possess H.N.C. or equivalent qualifications and have operating experience in a modern power station.

Opportunities will be given for further operational experience.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 17th July, 1961. 1621

ELECTRICITY CORPORATION OF NIGERIA**Vacancies for Consumers' Engineers**

APPLICATIONS are invited for appointments with the Electricity Corporation of Nigeria as Consumers' Engineers.

QUALIFICATIONS: Applicants should have had several years' experience with the commercial department of an electricity supply authority, together with sound technical training and knowledge of installation practice. Possession of a Higher National Certificate or similar technical qualification will be an added advantage.

DUTIES: Successful candidates will be required to take charge of a District Commercial Organisation. They will be responsible for maintenance of all consumers' records, dealing with consumer enquiries, new supplies of electricity, liaison with wiring contractors and general supervision of the various sub-sections engaged on meter installation, and testing and inspection of wiring installations.

EMOLUMENTS: Salary Scale 13 (Middle and Upper Segments), £1,095 × £52 to £1,251/£1,303 × £63 to £1,555 p.a., plus inducement addition of £240, £270, £300 p.a., plus contract allowance of 10% of basic salary. Gratuity representing 25% of basic salary, plus inducement addition is also payable on satisfactory completion of contract. Car allowance of £156 or £180 p.a. depending on duties and children's separate domicile allowance of £57/£65/£75 p.a. Note. Inducement and contract allowances and gratuity for expatriates only.

SERVICE CONDITIONS: Contracts are normally one to two tours of 18 to 24 months' service per tour for expatriates. Leave is granted at the rate of one week per month's service, plus travelling time to and fro at the rate of 13 days each way by sea and 7 days each way by air and the officer is on full pay during the period. Appointments will be pensionable and on three years' probation for Nigerians.

QUARTERS: Quarters will be provided for expatriates and will be furnished with hard furnishings only. Rent will be deductible at the rate of 8½% of basic salary up to a ceiling of £150 p.a. Where quarters are not provided for Nigerian Officers, rent allowance up to a maximum of 6½% of basic salary will be paid.

METHOD OF APPLICATION: Further particulars and application forms may be obtained from the Liaison Officer, Electricity Corporation of Nigeria, Adelphi, John Adam Street, London, W.C.2.

Application forms should be returned after completion to the Liaison Officer not later than 24th July, 1961. 1603

Leading Domestic Appliance Manufacturer
requires a

CHIEF DESIGNER -F.H.P. MOTORS

Sound qualifications and extensive design
experience applicable to a range of Domestic
Appliances essential.

Salary and conditions are highly attractive and
assistance with accommodation will be given.

Please write fully to:- Box No. 1605.

LONDON ELECTRICITY BOARD

Assistant Chief Engineer (Operations)

APPLICATIONS are invited for the position of ASSISTANT CHIEF ENGINEER (Operations) on the Headquarters Staff of the Chief Engineer, to take responsibility for the work of the Operations Branch of the Chief Engineer's Department at present located at Alpha Place, Flood Street, Chelsea, London, S.W.3.

The successful applicant will be responsible to the Chief Engineer for the control, operation and maintenance of the Board's transmission system, together with the installation and maintenance of the Board's internal communication systems and co-ordination of G.P.O. requirements. He will also be responsible for the provision and maintenance of the Board's transport fleet.

Applicants must be chartered electrical engineers with extensive experience of the design, construction and operation of transmission and distribution systems, and also have considerable knowledge of the operation and maintenance of a large transport fleet and internal communication systems.

The commencing salary will be within Class C, Grade 8 of the National Joint Managerial and Higher Executive Grades Agreement with a salary range of £2,875 to £3,100 inclusive of London allowance.

Applications should be sent direct to the Secretary of the Board at 46, New Broad Street, London, E.C.2, to arrive not later than Monday, 24th July, 1961 (ref. PER/V/3350/R). 1628

ADMINISTRATIVE COUNTY OF LEICESTER

ASSISTANT ELECTRICAL ENGINEER, £960-£1,310. Candidates must be Associate Members of the Institution of Electrical Engineers or be in possession of the Higher National Certificate and be experienced in the design of electrical installations for all types of buildings.

Removal expenses and lodging allowance may be paid to a married man.

Apply on form available from the County Architect, 123, London Road, Leicester. 174

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

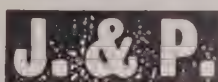
Vacancy No. 221/ER/61

APPLICATIONS are invited for the superannuable N.J.B. appointment of ASSISTANT SHIFT CHARGE ENGINEER, Tir John Power Station, Swansea.

Salary Class H, Grade 9, Scale 8 (£1,040-£1,165 per annum) plus 10% shift allowance.

Applicants should possess H.N.C. or equivalent qualifications and have had operating experience in a modern power station.

Special application forms are obtainable from Divisional Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-Fedwen Road, Gabalfa, Cardiff, to be returned by 17th July, 1961. 1623



ASSISTANT CHIEF DRAUGHTSMAN

Switchgear Dept.

JOHNSON & PHILLIPS Ltd. invite applications for the position of ASSISTANT TO CHIEF DRAUGHTSMAN. Applicants must have practical and D.O. experience in industrial switchgear. Minimum qualifications H.N.C.

Applications stating age, training and experience to—Employment Manager, Johnson & Phillips Ltd., Charlton, London, S.E.7.

1592

PROJECT ENGINEER

required by Kodak Limited. The work will include acquiring an intimate knowledge of plant and equipment in a specific area and the planning, co-ordination and technical supervision of work programmes within that area under the general direction of a senior engineer.

Candidates should have a good knowledge of shop techniques and some knowledge of drawing office procedure. Electrical background to H.N.C. level; experience of work in a chemical plant desirable. Salary according to experience.

The Company has over 1,000 employees in its engineering division and operates an annual profit sharing scheme, a voluntary part-contributory life insurance plan, and a pension scheme.

Please apply quoting JAW/11.

Men's Personnel Dept.
KODAK LIMITED (FACTORIES)
Harrow, Middlesex

1580

A LEADING LONDON ELECTRICAL CONTRACTOR

has the following staff vacancies, due to expansion of business:—

- (1) SUPERVISING ENGINEER capable of handling large contracts from enquiry stage to completion.
- (2) A BUYER to control the ordering department.
- (3) A SENIOR MALE CLERK to control the department dealing with measurements, progress claims and final invoices.

All the above situations will be superannuated after a probationary period and will have good prospects for persons under 45 years of age anxious to join a progressive and expanding company.

All existing staff are aware of these vacancies. Write in strictest confidence to—Box 1559.

Situations Vacant (continued)**SOUTH OF SCOTLAND
ELECTRICITY BOARD****Glasgow Area**

APPLICATIONS for the following superannuable appointments are invited from engineers having technical qualifications leading to Corporate Membership of the Institution of Electrical Engineers.

(1) SECOND ASSISTANT ENGINEER
(Meter, Test and Protection).
Reference No. GE/46/61.

Candidates should have considerable experience within at least three of the following fields:—

- (1) The operation of a Class A meter testing station, undertaking the large scale repair, testing and certification of consumers' meters.
- (2) Programming and controlling the periodical change of meters in accordance with the Electricity Supply (Meters) Acts.
- (3) The pressure testing of E.H.V. cables and apparatus and the location of E.H.V. faults.
- (4) The development and organisation of an E.H.V. power transformer overhaul and test station.
- (5) The application of electronic techniques to polyphase metering and supervisory control circuits.

A knowledge of the principles of work study and the ability to apply them to the above problems would be considered an advantage.

Salary £1,535-£1,720 per annum in accordance with Class L, Grade 6 (Scale 14) of the N.J.B. salary scale.

(2) SECOND ASSISTANT ENGINEER
(Construction).
Reference No. GE/47/61.

The duties connected with this post will include the erection and commissioning of large 33 kV primary and 6.6 kV secondary substations, conversion of existing primary substations from 20 kV to 33 kV and cable laying in a congested urban area.

Candidates should have a sound knowledge of building construction, including layout and design of substations, offices and service centres.

Salary £1,535-£1,720 per annum in accordance with Class L, Grade 6 (Scale 14) of the N.J.B. salary scale.

The successful candidates for these posts shall be required to reside within reasonable travelling distance of Area Headquarters.

Applications, quoting appropriate reference number, should be submitted on the standard application form which is obtainable from the Area Secretary, South of Scotland Electricity Board, Glasgow Area, P.O. Box 6, 75, Waterloo Street, Glasgow, C.2, and should be returned not later than Friday, 21st July, 1961. 1564

**CENTRAL ELECTRICITY
GENERATING BOARD****North Eastern and Yorkshire Region****Regional Electrical Department
Quantity Surveyors**

APPLICATIONS are invited from qualified Quantity Surveyors to work in a team responsible for civil engineering construction in the Regional Transmission Project Branch based at Leeds.

The successful candidates will work under a Civil Contracts Engineer and the duties will cover the preparation of enquiry documents, in particular the compiling of bills of quantities, together with the negotiation of rates and the agreement of interim and final measurements.

The civil engineering works cover primarily reinforced concrete and building trades, but experience in structural steel would be an advantage, and candidates should be fully experienced in the Institution of Civil Engineers' standard method of measurements.

The salary for the posts will be in accordance with the National Joint Board Agreement, Class BX, Grade 7 (£1,200-£1,500 per annum).

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1, Whitehall Road, Leeds, 1, to whom they should be returned to arrive not later than 18th July, 1961. 1560



**A well known Mining
Company in GHANA
wishes to engage an
ELECTRICAL
ENGINEER**

This appointment offers an attractive and interesting career with a progressive company. A salary of between £150 and £170 per month, according to experience, is offered. The Company operates a non-contributory Pension Scheme for which all staff are eligible after one year's satisfactory service. A free bungalow with hard furnishings is provided as well as free transport.

Each tour of duty is 15 months and this is followed by three months leave, on full pay. Free passages are provided by air or sea for the Electrical Engineer and his wife.

*Applicants are invited
to write in confidence,
giving brief personal
particulars, to:—*

**Reference C/EEG/29,
Overseas Appointments, Ltd.,
12, Grosvenor Place,
London, S.W.1.**

1570

Electricity**AND FOOD!**

New Techniques
New Products
Increasing Mechanization
Higher Operating Speeds

These developments all spell
opportunity for electrical
men in the food industry!

The fast expanding food industry offers both stability and development to progressive electrical draughtsmen and foremost is Heinz with headquarters in North-West London.

A draughtsman is required on the Head Office staff to design and prepare drawings for power and lighting installations and for control schemes for automatic processes etc. If suitably experienced, he will also exercise some supervision of contractors.

Candidates may be of O.N.C. or H.N.C. (Electrical) standard but alternative qualifications may be acceptable if supported by sound practical experience.

Employment conditions are excellent and include a non-contributory pension and free life assurance.

Please apply with a brief summary of personal history to:—

The Personnel Officer

H. J. HEINZ COMPANY LIMITED
Waxlow Road, Harlesden, London, N.W.10

1562

**CENTRAL ELECTRICITY
GENERATING BOARD****West Midlands Division**

OPERATION SUPERINTENDENT is required at Ocker Hill Power Station. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade G.5, £1,275-£1,410 per annum.

Applicants should have received a sound technical and practical training, and should have considerable experience in the operation and maintenance problems arising in a large modern power station. The possession of a recognised technical qualification will be an advantage.

Apply, quoting vacancy number 177/61 MD, on form AE6 available from the Station Superintendent, Ocker Hill Power Station, Bayley's Lane, Ocker Hill, Tipton, Staffs, by 17th July, 1961. 1611

MIDDLESEX COUNTY COUNCIL**Main Drainage Department**

ELECTRICAL ENGINEER required at Mogden Works, Isleworth, for supervision of maintenance and installation of L.T., D.C. and A.C. motors, generators, switchgear, cable work and general electrical services. Should hold M.O.T. first class certificate or equivalent and must have held responsible post. Ability to control labour and deal with unusual problems in development work essential. Commencing salary according to qualifications and experience, APT. III, £1,005 to £1,185. Possibility of housing accommodation. Prescribed conditions.

Applications (2 referees) to Chief Engineer, Middlesex County Main Drainage Dept., P.O. Box No. 7, Isleworth, Middx. (Quote G.702E.R.) 1588

YORKSHIRE ELECTRICITY BOARD

No. 3 (Sheffield) Sub-Area
SECOND ASSISTANT ENGINEER
(Construction).

Duties will include the specification, design and construction of indoor and outdoor substations for underground and overhead transmission systems operating at voltages up to 66 kV, and negotiations with plant manufacturers.

Applicants should have an all round general knowledge of substation plant and experience of field construction.

Salary N.J.B. Class N, Grade 7 (Scale 15), £1,650/£1,830 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, 1, not later than 21st July, 1961.

No. 6 (Hull) Sub-Area
HULL DISTRICT
FOURTH ASSISTANT DISTRICT
ENGINEER.

Applicants should have had a good general and technical education with practical training in planning, construction, operation and maintenance of underground and overhead systems.

The successful candidate will be required to reside within the District and undertake standby duties.

Salary N.J.B. Class K, Grade 11 (Scale 8), £1,040/£1,165 per annum.

SUB-AREA HEADQUARTERS
DEMONSTRATOR or ASSISTANT
DEMONSTRATOR.

Candidates should have had domestic science training, including housecraft, and should preferably hold the E.A.W. Certificate or Diploma. They should be competent to lecture and advise consumers on the utilisation of domestic electrical appliances and be able to give demonstrations with a sales emphasis. The successful candidate will normally be located at Hull, but may be required to work throughout the Sub-Area if occasion demands.

Salary Demonstrator N.J.C. Grade 1, £600/£700 per annum; Assistant Demonstrator N.J.C. £265/£565 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than 21st July, 1961.

No. 4 (Leeds) Sub-Area
LEEDS NORTH WEST DISTRICT
FOURTH ASSISTANT DISTRICT
ENGINEER.

Applicants should have had some experience in the design, construction, operation and maintenance of h.v. and n.v. urban distribution systems.

Salary N.J.B. Class G, Grade 11 (Scale 5), £825/£940 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, Leeds, not later than 21st July, 1961. 1613

CENTRAL ELECTRICITY
GENERATING BOARD

South Thames Division

Electrical Engineer's Department

THIRD ASSISTANT ENGINEER
(System Design and Planning),
DIVISIONAL HEADQUARTERS,
KINGSTON
(Vacancy No. 135A/61).

Candidates must possess the Higher National Certificate in Electrical Engineering or equivalent qualification leading to Graduate Membership of the Institution of Electrical Engineers. An interest in and some experience of system design, load flow and fault current calculations, including the use of A.C. and D.C. network analysers, is essential.

N.J.B. salary within the range £1,180 to £1,670 per annum, including London allowance, according to qualifications and experience.

Applications giving age, details of experience, qualifications, present position, etc., should be sent to the Personnel Officer, Central Electricity House, Lower Ham Road, Kingston-upon-Thames, Surrey, to arrive by 26th July, 1961. 1619

ENGLISH ELECTRIC
STAFFORD

Transformer Division

SENIOR DEVELOPMENT ENGINEER

AN experienced Engineer is required to lead a group engaged in the development of new types of cores of greater efficiency and lower noise characteristics for transformers up to the largest sizes yet made or envisaged.

Large scale experimental work will be involved and first-class laboratory facilities are available.

Applicants should be graduates or equivalent and have relevant experience in this field. Salary will be commensurate with experience and qualifications.

DEVELOPMENT ENGINEERS

Vacancies also exist in the fields of transformer development, typically insulation and magnetic studies within windings.

Applications would again be welcomed from graduates or equivalent but more limited direct experience would be expected.

Full details of housing and removal assistance will be given at interview. Applications should be made in writing to Mr. D. H. Ryder, Transformer Division, c/o Dept. G.P.S., English Electric House, Strand, London, W.C.2. Please quote reference number ER 1295P. 1597

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEER,
Woking District.

Salary £825-£940 per annum under N.J.B. Class G, Grade 11. Superannuable. This appointment occurs in a rapidly expanding urban and rural district. Applicants should have minimum qualifications of the Ordinary National Certificate in Electrical Engineering and should have had general engineering experience preferably in the electricity supply industry. Consideration will be given to a private car allowance and, in appropriate circumstances, to assistance with housing.

Applications, quoting ER and naming two referees, on forms from District Manager, SEEBOARD, 4, Chobham Road, Woking, by 26th July, 1961.

SUB-AREA COMMERCIAL OFFICER,
Mid-Sussex.

The Sub-Area Commercial Officer in Mid-Sussex retires at the end of this year and applications are invited for the post.

Applicants should preferably be Chartered Electrical Engineers. The person appointed would be directly responsible to the Sub-Area Manager for the co-ordination of commercial staff and activities in the sub-area, and should have extensive practical experience in load development, contracting and the operation of showrooms.

Salary in accordance with Class D, Grade 5 of the N.J.M. and H.E. Grades Committee, commencing at £2,380 per annum and rising to £2,595 per annum.

Applications to the Mid-Sussex Manager, SEEBOARD, Mid-Sussex House, North Road, Brighton, in a confidential enveloped marked "Sub-Area Commercial Officer" by 4th August, 1961.

SENIOR DEMONSTRATOR,
Dorking and Epsom District.

Salary within the range £700 × £25 to £775 per annum under N.J.C. Grade 2. Superannuable. Applicants should hold a recognised qualification in domestic science and the E.A.W. Certificate and be prepared to work anywhere in the Dorking and Epsom District. They should be experienced in giving talks and demonstrations on all types of domestic apparatus and will be required to assist in training and in general showroom work.

Applications, quoting ER on forms from District Manager, SEEBOARD, 56, South Street, Dorking, by 19th July, 1961.

GEORGE WRAY,
Secretary. 1615

AIR MINISTRY

STATION ENGINEERS GRADE III required to supervise the installation, operation and maintenance of electrical or mechanical plant; (a) ELECTRICAL ENGINEERS at R.A.F. and Ministry of Aviation establishments in the U.K. (with overseas tour subsequently) and (b) ELECTRICAL or MECHANICAL ENGINEERS for service initially in overseas areas on tours of 2 or 3 years' duration. 5-day week with 18 days paid leave a year initially.

SALARY which is dependent upon age, qualifications and experience ranges in the U.K. from £776 (age 25) to £961 max. in Grade III. Pension prospects and also opportunities of advancement to numerous posts in the higher grades, viz.:—

Technical Grade II, £961-£1,098. 280 posts.
Inspector of Works, Grade I, £1,098-£1,348. 140 posts.

Technical Grade B, £1,348-£1,552. 29 posts.

Technical Grade A, £1,439-£1,697. 17 posts.

Vacancies occurring in these higher grades are, as a rule, filled by promotion of existing staff.

OVERSEAS Salary £826 (age 25) to £1,014 (max.) plus tax free foreign service allowance which varies according to location, marital status, etc., and ranges at present up to £1,800 p.a. Expatriation and kit allowances and free passage for self and family when accommodation arranged. Free medical and educational arrangements.

QUALS. AND EXP. Applicants who must be natural born British subjects, up to age 55, should have served an apprenticeship and should hold an O.N.C. or C. & G. Technical Certificate or 2nd Class M. of T. Certificate or equivalent. Experience required in one or more of the following:—

Electrical Generation; Electrical Distribution, H.T. and L.T.; Electrical Installations, Industrial and Domestic; Light Current and/or Electronic Engineering; Ventilation and Air Conditioning; Heating and Hot Water Supply; Compressed Gases and Refrigeration; Bulk Fuel Installations; Diesel Engine Driven Plant.

Internal training courses are provided and financial assistance and time off is allowed for recognised courses of study leading to higher qualifications.

Forms from Manager (P.E.I.), Ministry of Labour, Professional and Executive Register, Atlantic House, Farringdon Street, London, E.C.4. Candidates selected will be interviewed in London and certain expenses reimbursed. Only applicants selected for interview will be advised. 262

Situations Vacant (continued)**SOUTH OF SCOTLAND
ELECTRICITY BOARD****Lanarkshire Area**

APPLICATIONS are invited for the following superannuable appointments:—

(1) **FIRST ASSISTANT DISTRICT
ENGINEER,
RUTHERGLEN DISTRICT.**

Candidates should preferably be Corporate Members of the Institution of Electrical Engineers or should hold equivalent qualifications. They should have had a sound engineering training with subsequent experience in the maintenance and operation of H.V. and L.V. switchgear together with experience in H.V. and L.V. fault location, and be conversant with the preparation of load flow diagrams, voltage drop and short circuit calculations. They should also have had some experience in overhead line work.

Salary N.J.B. Class H, Grade 4 (Scale 13), £1,440/£1,610 per annum.

(2) **SECOND ASSISTANT DISTRICT
ENGINEER,
MOTHERWELL DISTRICT.**

Candidates should have had sound engineering and technical training, with qualifications leading to Corporate Membership of the Institution of Electrical Engineers. They should have had experience with the maintenance and operation of H.V. and L.V. overhead and underground networks, and substations on a large distribution system. They should also be conversant with load flow diagrams, voltage drop, and short circuit calculations, and should have had experience with H.V. fault location.

Salary N.J.B. Class G, Grade 7 (Scale 9), £1,115/£1,245 per annum.

The successful applicants will require to reside within a reasonable distance of the respective District Offices.

Application forms, which can be obtained from the Area Manager, Montrose Crescent, Hamilton, should be returned within 14 days of the date of this advertisement. 1612

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

**Monmouthshire and Mid-Wales Area
GENERAL ASSISTANT ENGINEER,
NEWPORT DISTRICT.**

The duties of this post will be of a general nature and preference will be given to engineers possessing the Higher National Certificate in Electrical Engineering.

Salary N.J.B. Class H, Grade 7, Scale 10, £1,190/£1,325 per annum.

Applications stating age, present position, present salary, qualifications and experience should be addressed to W. E. Richardson, M.I.E.E., Manager, Monmouthshire and Mid-Wales Area, Llywelyn Road, Cwmbran, Mon., to arrive not later than 22nd July, 1961.

Please quote ref. SV/83/61/ER, endorsing envelope "General Assistant Engineer."

**Swansea and West Central Area
GENERAL ASSISTANT ENGINEER,
PORT TALBOT DISTRICT.**

The duties of this post will be of a general nature and preference will be given to engineers possessing the Higher National Certificate in Electrical Engineering.

Salary N.J.B. Class H, Grade 11, Scale 6, £890/£1,015 per annum.

Applications stating age, present position, present salary, qualifications and experience should be addressed to G. R. T. Edwards, B.Sc., M.I.E.E., M.Am.I.E.E., Manager, Swansea and West Central Area, 29, Ystrad Road, Fforestfach, Swansea, Glam., to arrive not later than 22nd July, 1961.

Please quote ref. SV/84/61/ER, endorsing envelope "General Assistant Engineer."

R. G. WILLIAMS,

Secretary. 1624

**OVERHEAD TRANSMISSION LINE
ENGINEERS**

LARGE contracting organisation has vacancies in Scotland for Site Agents, Sub Agents and Engineers of proved ability with experience of steel tower overhead line construction. Age and full details of experience, which will be treated in confidence, to—Box 529, Keith & Co., 137, Princes Street, Edinburgh. 1578

J. & P.**JOHNSON & PHILLIPS (PAKISTAN) LTD.****Assistant General Manager**

JOHNSON & PHILLIPS Ltd. invite applications from suitably qualified men for this important position in their subsidiary company in Karachi. This company is principally engaged in the manufacture and sale of switchgear up to 11 kV and the factory is at present being expanded. The appointment should interest a young man who is anxious to gain experience in overseas company work and the responsibilities are such that, apart from experience in general company management, a strong bias towards the manufacture of switchgear or some similar product is essential.

Applications giving full particulars of the candidate's background and experience should be addressed to the Director and General Manager, Johnson & Phillips Ltd., Victoria Works, Charlton, London, S.E.7.

1591

Eastern Electricity**Chilterns Sub-Area**

**FIRST ASSISTANT DISTRICT
COMMERCIAL ENGINEER,
BEDFORD DISTRICT
(152/61.R).**

Candidates should have had a good general and technical education and experience in electrical contracting and maintenance work. The successful applicant will be responsible to the District Commercial Engineer for commercial development, supervision of wiring installation work including estimating for all types of industrial, agricultural and domestic installations and such general consumer advisory service as would be anticipated in a District having important industrial, agricultural and housing development. He would also be responsible for operating an efficient maintenance service.

Salary N.J.B. Class G, Grade 6, £1,190-£1,325.

Apply by letter to the Manager, Bedford District, Eastern Electricity Board, Prebend Street, Bedford, by 21st July, 1961.

**ASSISTANT ENGINEER (Commercial),
HEMEL HEMPSTEAD DISTRICT
(155/61.R).**

Candidates should have had experience in industrial, commercial and domestic applications of electricity, and should be familiar with tariffs and their application to different classes of consumers. Experience in thermal storage and general space heating of buildings would be an advantage, and preference will be given to candidates having a good technical background.

Salary N.J.B. Class G, Grade 9 (£965-£1,090).

Apply by letter to the Manager, Hemel Hempstead District, Eastern Electricity Board, Bridge Street, Hemel Hempstead, by 21st July, 1961. 1618

**CENTRAL ELECTRICITY
GENERATING BOARD****South Thames Division****Littlebrook Power Station**

OPERATING FOREMAN (Shift) (Vacancy No. 186/61). The successful applicant will be responsible to the Assistant Charge Engineer for shift work duties relating to boiler and turbine operation. Applicants should have had power station shift operation experience, preferably in both boiler and turbine houses, and have had experience in the control of labour.

Salary N.J.I.C. Schedule B, Grade 1, £1,035 per annum, including London and shift allowances. Good conditions and holidays; sick pay and optional superannuation schemes; canteen and sports and social club facilities.

Applications giving age, details of experience, etc., should be sent to the Station Superintendent, Littlebrook Power Station, nr. Dartford, Kent, to arrive by 12th July. 1617

**CAMEROONS DEVELOPMENT
CORPORATION**

**The Southern Cameroons
require an**

ELECTRICAL SUPERVISOR who should be over 30 years of age and must have served a recognised apprenticeship and possess the Ordinary National Certificate in Electrical Engineering. The selected candidate will be in charge of workshops, undertaking the repair and maintenance of industrial and domestic electrical equipment, and will be responsible for maintenance and installation work over a large area. Practical experience of industrial and domestic installations, H.T. and L.T. distribution is required, knowledge of C.B. and PAX telephone systems and refrigeration desirable.

Minimum commencing salary £1,100 p.a., plus participation in the bonus scheme. Free return passages. Free furnished accommodation and a reasonable amount of free light and fuel. Free medical attention in the territory. Outfit allowance of £80. Children's allowances are payable up to a maximum of two, at the rate of £75 each p.a. Provident fund. Tours of 18-24 months with liberal leave on full pay on completion of tour.

Applicants should send full particulars to the Personnel Officer, Colonial Development Corporation, 33, Hill Street, London, W.1, quoting Serial 503. 1581

**CENTRAL ELECTRICITY
GENERATING BOARD****North Eastern and Yorkshire Region**

**Fourth Assistant Engineer
Transmission Department, Rotherham**

APPLICATIONS are invited for the appointment as a FOURTH ASSISTANT ENGINEER, Rotherham Transmiss on Section.

Applicants should preferably have had some experience of the maintenance and operation of high voltage (132 kV and above) transmission systems and technical qualifications to Higher National Certificate standard.

The successful applicant will be required to reside in the Rotherham locality.

The salary for the appointment will be in accordance with Grade 11 BX, Schedule B of the National Joint Board Agreement (£900-£1,165 per annum) and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1, Whitehall Road, Leeds, 1, to whom they should be returned to arrive not later than the 17th July, 1961. 1609

**CLASSIFIED ADVERTISEMENTS
ARE PREPAID**

W. H. ALLEN SONS & CO. LTD.

have a vacancy for a

**SALES ESTIMATING & CONTRACTS
ENGINEER**

in their

ELECTRICAL DEPARTMENT

Candidates should be between 25-35 years old and possess at least an H.N.C. in Electrical Engineering or equivalent. The work will cover proposals involving A.C. and D.C. generators and motors, switchgear and control gear for land and/or marine applications. Previous experience is desirable but not essential. Salary according to experience and qualifications.

Application forms, etc., can be obtained from:—

The Personnel Manager (Ref. 507/3)
Queens Engineering Works
Bedford

1487

LONDON ELECTRICITY BOARD**Assistant Distribution Engineer**

APPPLICATIONS are invited for the above position in the Board's South Eastern District at 44, Powis Street, Woolwich, London, S.E.18.

Applicants should have a sound technical education to the standard of the Higher National Certificate and possess practical experience in all branches of engineering work associated with the organisation of a District distribution department.

The post is graded under Schedule A of the National Joint Board Agreement as Class H, Grade 9, £1,090 per annum rising to £1,215 per annum, inclusive of London allowance.

Applications stating age, qualifications and experience should be sent direct to the Manager, South Eastern District, 44, Powis St., London, S.E.18, within 14 days of the publication date of this notice. Please quote ref. PER/V/3312/R.

1627

**ELECTRICAL
ENGINEER**

ENGINEERING concern has vacant position for an electrical engineer for product development work, particularly on F.H.P. motors.

Preference will be given to electrical engineers with a 5-year apprenticeship; aged 25/35 with minimum technical qualifications H.N.C.

Post will carry salary commensurate with qualifications and experience required.

Apply to:

Managing Director
SINGER ENGINEERING CO. LTD.
CLYDEBANK

1565

LONDON ELECTRICITY BOARD**Showroom Assistants**

APPPLICATIONS are invited for positions as Showroom Assistants in the Hackney and Islington areas of the Board's Northern District.

Sales experience, particularly in connection with domestic electrical appliances, will be an advantage.

Salary within range £490/£740 p.a. inclusive according to age, experience and qualifications.

Apply in writing to the Manager at 18/24, Lower Clapton Road, London, E.5, quoting ref. PER/GC/2897/R.

1626

AE.I., Higher Openshaw, require switchgear draughtsmen for design of connections, also layouts of switchboards and stations. Applications giving full details of age, experience and qualifications should be sent to the Personnel Manager, A.E.I., Switchgear Division, Higher Openshaw, Manchester, 11.

1573

ARMATURE winder required with experience of machines up to 100 h.p. Ideal opportunity for young skilled man to establish a permanent position and gain further experience. Apply in writing, giving age, experience, and present wages to—Works Employment Officer, Fuller Electric Ltd., Fulbourne Road, Walthamstow, London, E.17.

1498

ASSISTANT electrical engineers with at least H.N.C. and 2/3 years' experience of E.H.V. transmission work required by consulting engineers in their contracts and design department, Weybridge. Applications stating age, qualifications, experience and salary required to—Kennedy & Donkin, 12, Caxton Street, London, S.W.1, quoting ref. RWMc.

177

BITISH ENGINE BOILER & ELECTRICAL INSURANCE Co. Ltd., Longridge House, Manchester, 4. Electrical surveyor required. Permanent position carrying progressive salary scale £825 to £1,225 with non-contributory pension. Candidates aged 26 to 32, with H.N.C. in electrical engineering or Grad. I.E.E. and with apprenticeship in manufacture or repair of electrical machinery, are invited to apply stating age, qualifications and experience.

1583

CABLE contracts engineers with experience installations to at least 33 kV. Must be prepared to travel anywhere in U.K. Apply giving details of work carried out to—Contracts Manager, Enfield-Standard Power Cables Ltd., Stockingswater Lane, Brimsdown (Howard 2468).

1600

CABLE estimator required. State age and experience.—Wandle Side Cable Works Ltd., 106, Garratt Lane, Wandsworth, London S.W.18.

1351

CHARGEHANDS required for expanding electrical contractors in North-West London area. Excellent promotion opportunities for keen men. Please write giving details of past experience and employers to—Box 1513.

CHINESE (Cantonese) engineer required for service with merchant company in Hong-kong. Preferably should hold B.Sc. or A.M.I.E.E. Age 25/30. Sales include general electrical and mechanical engineering supplies, also air-conditioning plant, refrigerators, cables, motors, pumps, etc. Good salary plus commission and excellent prospects. Write—Box 2040, c/o Abbotts, Eastcheap, London, E.C.3.

1607

COMMERCIAL sales engineer required by merchant company for service in Singapore. Minimum qualification O.N.C. (either elec. or mech.); age about 25; bachelor preferred. Good salary, scale according to qualifications and experience. Excellent prospects, annual increments, provident fund; non-contributory pension scheme; free furnished accommodation; passage provided. Write—Box No. 2037, c/o Abbotts, Eastcheap, London, E.C.3.

1584

CONSULTING engineers in Westminster have vacancy for a qualified electrical engineer preferably experienced in lighting and power installation work, distribution, etc. Applicants are invited to send details of their age, qualifications and experience, etc., to—Messrs. Mackness & Shipley, Parliament Mansions, Abbey Orchard Street, London, S.W.1, quoting reference P.1210.

1568

DRAUGHTSMEN required for interesting work on control and protection gear diagrams. Good conditions and prospects. Manchester area. Technical training to H.N.C. standard preferred. Applications to—Box 1574.

EDITORIAL assistant for Journal of the Institution of Electrical Engineers. Engineering or science degree and some engineering experience necessary. Journalistic knowledge desirable but those with literary ability would be considered. Good prospects for advancement. Pension scheme. Age about 30. Comm. salary of the order of £1,000 plus or minus an amount to be determined according to qualifications and experience. Apply—Secretary, I.E.E., Savoy Place, London, W.C.2.

1629

ELECTRIC motor and armature winders required immediately.—Hill, Upton & Co. Ltd., George Street, Oxford.

1601

ELECTRICAL contractors operating in industry on a large scale require branch manager to assume full responsibility. This post offers excellent conditions for the right man who must have current experience of a similar position. Please write giving full details, which will be dealt with in the strictest confidence, to—Box 1602.

ELECTRICAL contractors require supervising engineer for Ghana. 12 months tour plus 8 weeks leave. Applications in writing giving full details to—Marryat & Place Ltd., 40, Hatton Garden, London, E.C.1.

1478

ELECTRICAL draughtsman required for consulting engineers' office to assist in the preparation and design of electrical services for all classes of buildings, including hospitals, industrial and commercial buildings, at home and abroad. Spring and summer holidays. Pension scheme and luncheon vouchers. Apply in writing, stating age, experience, present salary and salary required, to—J. Roger Preston & Partners, 15, North Audley Street, London, W.1.

1630

ELECTRICAL engineer required by consulting engineers. Applicants should be Corporate Members of the Institution of Electrical Engineers and have at least 5 years' design experience, preferably in contractors' offices. The successful applicant will be solely responsible to the partners. The work involved is the design of electrical installations for hospitals, office buildings, etc. Write to Box 1632, or telephone Miss Barnes at HYDe Park 8918.

ELECTRICAL engineering assistant for London office staff of construction company dealing with contracting work for electrical transmission and distribution cables and overhead lines, all voltages. Age range 21-35. We are particularly interested in applicants with O.N.C. or H.N.C. Electrical Engineering, or equivalent, but other technical qualifications will be considered. Write Commercial Manager, A.E.I. Ltd., Construction (Cables & Lines) Division, 59/62, High Holborn, London, W.C.1.

1631

HEATING INVESTMENTS require a draughtsman (age about 20 years) for electric floor-warming work of all types. Training given to a superior man willing to be groomed for executive rank. Brief details of experience to—Heating Investments Ltd., 284, Regent's Park Road, Finchley, London, N.3.

1500

HONGKONG. Merchant company require qualified engineer for sales department dealing in general electrical and mechanical engineering supplies, including air-conditioning plants, refrigerators, cables, motors, pumps, etc. B.Sc. or A.M.I.E.E. preferred, and sound commercial experience. Age 30/35. Good salary plus commission, excellent prospects. Write—Box 2036, c/o Abbotts, Eastcheap, London, E.C.3.

1585

MAJOR cable contractor operating in the N.E. area have vacancies for supervising engineers. Applicants should hold O.N.C. or H.N.C. Electrical Engineering. Similar experience with a major cable company or area board would be an added advantage. Apply, stating age, experience and salary required, to—Box 1425.

OLD-established electrical contractors, N.W. Lond., require cost accounts clerk to be responsible for interim valuations, preparation final accounts, etc. This is a senior appointment offering a good salary. Congenial conditions. Pension and housing. Write full details.—Box 1476.

SALES office assistant required by expanding company manufacturing precision miniature switches. Interesting work and good prospects offered to applicant accustomed to prompt and clear correspondence.—Castelco (G.B.) Ltd., Old Woking, Surrey.

1554

SALES representative. Trainee required by electrical engineering company situated in West London. Industrial electrical engineering background and knowledge of power factor correction would be an advantage. Superannuation scheme. Write giving full details of experience, education, age and state salary required to—Box S.R. 5347, A.K. Adv. Ltd., 212a, Shaftesbury Ave., London, W.C.2.

1582

STORES manager for large London electrical wholesalers. Only applicants with similar experience will be considered. Must be first-class organiser. Able to control staff and ability to use transport economically. Commencing salary £1,250 per annum. Reply stating age and full details of previous experience.—Box 1516.

Situations Vacant (continued)

TRANSFORMER design engineer required to join a team engaged in the design of advanced voltage regulation and control systems. Minimum qualifications, H.N.C. in electrical engineering with three to four years' experience of transformer design up to 1,000 kVA. Power transducer design experience would be an advantage. The company is situated near London and offers assistance with housing and removal expenses if necessary. Send details of qualifications, experience and salary required to—Box 1576.

V.H.F./U.H.F. radio engineer for planning multi-channel systems associated with H.F. radio and coaxial cable projects. The engineer is required to have a good practical knowledge of V.H.F./U.H.F. radio equipment, multi-channel carrier equipment, and allied signalling and switching systems. Employment in first instance offered on a three-year contract basis, with salary according to qualifications and experience. Holiday arrangements respected this year. Reasonable removal expenses reimbursed. Write giving brief details of qualifications and experience to—Staff Manager, Cable and Wireless Limited, Mercury House, Theobalds Road, London, W.C.1. 1586

WORKS manager for plastic cable works. Important company. Must be fully experienced practical man. Please state salary required.—Box 1569.

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

A.M.I.E.E. (47) seeks post in London with executive/directorship prospects. Ten years sales manager. Wide range medium/light engineering. Real ability to shoulder responsibility. Certain of excellent references.—Box 8293

A TECHNICAL representative (35), A.R.T.C., A.A.M.(S.A.)I.E.E., experience contracting, supervising, maintenance, including five years overseas with large manufacturing combine, desires managerial executive position.—Box 8296

ELECTRICAL engineer, 30 years' contracting experience, administrative, estimating, supervising.—Box 8294.

ENGINEERING assistant, design, drawing, seeks suitable post, Cheltenham or Cotswold town.—Box 8290.

REPRESENTATIVE, 15 years electrical trade, including switchgear and water heating sales experience. Other offers welcomed. Manufacturer preferred. London area and Surrey.—Box 8295.

ARTICLES FOR SALE**MOTORS**

NEW CROMPTON PARKINSON, from $\frac{1}{4}$ h.p. to 80 h.p.; also 6,000 A.C. and D.C. reconditioned Motors and Starters.

IN STOCK HERE

B. E. WHITE

Brantwood Rd., Tottenham, London, N.17
Tel. EDMonton 4621-2 215

HOUSE SERVICE METERS

200 -240-v. A.C. or D.C., 10 amps. capacity, quarterly type, from 25s. each, plus 2s. 6d. carr.

UNIVERSAL ELECTRICAL CO.

221, City Road, London, E.C.1 37

A.A. ELECTRICAL Co. for A.C.-D.C. motors, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—CHI. 5105. 67, Rothschild Rd. London W.4. 57

A BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish, vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeyopt Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C. and D.C. 1/- slotmeters. Guaranteed 2 years, 2½-50 amps. From 55/-. Repairs and recalibrations. See Billard: Tradex Meter Co., Surbiton (Tel. Elmbridge 2234/5/6). 169

ALTERNATORS and generators, all types up to 150 kW.—Powerco Ltd., 312, York Road, London, S.W.18 (VAN. 5234). 151

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 600 kVA.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (CLERkenwell 5512). 24

ALTERNATORS for sale from 1,000 kVA at 750 r.p.m. down to ½ kVA. Single and three-phase. All voltages. More than 150 machines in stock. Automatic regulators and switchboards available.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

BARGAINS in electric motors from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Ring Monarch 3355. 50

BILLIARD meters. 1/-, 6d. or 1d. slot. All time settings. From 170/-. See Quarterly.—Tradex, Surbiton. 170

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists.—Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

CIRCUIT-breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

CONVERTERS, motor-alternators, motor-generators, frequency changers, etc. All types up to 100 kW.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 150

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 22

DAVENSET plating rectifiers, oil immersed, input 400/3/50; output 1,000 amps. 8 volts D.C. Fine and coarse control. 12 available.—Stewart Thomson & Sons (Liverpool) Ltd., Seaford, Liverpool, 21. 1575

DIESEL generating sets, all sizes to 500 kW. Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 16

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (CLERkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

FLUORESCENT tubes reconditioned and guaranteed with a life as new from 7s. 6d. each. Free collection and delivery in Lancs and Yorks. Save 40% on your tube replacement costs by using this service. We are also manufacturers of top quality fluorescent fittings, trunking systems, control gear and new fluorescent tubes. Generous discounts available.—Anglo-American Electrical Company, Clive Street, Bury (Telephone, Bolton 27251). 212

FOR sale, good unused and used machinery including electric motors, A.C. and D.C. dynamos, alternators, transformers, diesel and steam electric generating sets, mains failure sets, motor generator and Ward Leonard sets, switchgear, compressors, fans, capacitors, etc.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford, Herts (Tel. B.S. 1000/1). 161

GENERATING sets, portable or stationary, new and reconditioned, 1 to 100 kW, A.C. and D.C.—Powerco Ltd., 312, York Road, London, S.W.18 (VAN. 5234). 148

INSULATING varnish, clear, Minerva No. 1720, £10 per 40-gal. drum.—Lowton Metals Ltd., Sandy Lane, Lowton St. Mary's, Leigh, Lancs. (Tel. 71441/2). 93

KARDEX, Roncodex and Shannovue cabinets, as new.—F. H. Jolly & Co. Ltd., 289, King St., London, W.6 (RIV. 5381). 202

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

MOTORS and control gear, huge stocks all types, ½ to 200 h.p.—Ramsbottom & Co. Ltd., Elec. Engineers, Keighley (5444/7). 70

NAMEPLATES, engraving, diesinking, stencils.—Stiwell & Sons Ltd., 153, Far Gosford Street, Coventry. 108

PHASE converters, single to three-phase, several sizes in stock up to 90 h.p., 3-phase loading.—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 29

PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. and D.C. motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

PREPAYMENT 1s. slot house service meters.—Universal Electrical, 217-221, City Road, London, E.C.1. 36

PURLEY chokes and ballasts. Our 80-w. tapped h.p.f. ballast with starter switch-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject.—F. W. Blanshard Ltd. (Dept. ER), Purley, Surrey (Uplands 4818/9). 52

QUARTERLY credit meters, single and polyphase, 2½-100 amps. From 20/-. Also D.C. See Television.—Tradex, Surbiton. 171

ROTARY converters in stock, all sizes; enquiries invited.—Universal Electrical, 221, City Road, London, E.C.1. 34

SMALL BR screws and nuts in steel, brass and stainless steel, from stock.—Premier Screw & Repetition Co. Ltd., Woodgate, Leicester. 180

TELEVISION slotmeters and time switches. Details from: Tradex Meter Co., Surbiton (Elmbridge 2234/5/6). 172

VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.—Universal Electrical Co., 221, City Rd., London, E.C.1. 38

WARD Leonard motor generating sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

WHEATSTONE bridge with galvanometer by Sullivan precision instrument.—Norbatt E.M.M. Co., Marsh, Pudsey (Phone, Pudsey 2416). 1556

1 type D.O.G.R. 660-volt rating 400-amp. H.T. oil-circuit breaker, originally purchased 1953. Excellent condition. No reasonable offer refused.—Russell's, 18, Queens Road, Watford. 1606

400-cycle to 1,500-cycle motor alternators and alternators.—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 27

500-kW, 220-volt Met-Vick rotary converter, with transformer, 11,000 volts, 3-phase, 50 cycles, and accessories.—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 17

EQUIPMENT FOR HIRE

GENERATING set hire service. Consult the most experienced firm for A.C. and D.C. units from 2 kW to 240 kW, diesel or petrol, stationary or mobile, sale or hire, 24-hr. breakdown service.—Dawson-Keith Ltd., Hillview Rd., Sutton, Surrey (Fairlands 4401). 46

ARTICLES WANTED**WANTED**

D.C./A.C. Motors, Transformers, Cables and all redundant Power Station plant wanted for dismantling.

ASK US TO QUOTE

B. M. T. CO. LTD.
London Road, Barking
(RIP. 3387/3715)

298

WELDING REGULATOR POTS WANTED

Any size or make. Working or otherwise.

ROBERTS BROS.

Meteor Works, Junction Road
Wordsley, Staffs

Tel. Stourbridge 3101-2-3-4 8279

WANTED FOR CASH

SURPLUS Diesel Generating Sets, all sizes up to 1,000 kW. We dismantle and remove.

DAWSON-KEITH LTD.
Hillview Road, Sutton
(Fairlands 4401/2/3)

47

A.C./D.C. electric motors, generators, transformers, disused stocks of cable, power houses bought and dismantled.—Samuel Hyams, 129, Lams Lane, Rainham, Essex (Rainham 4896).

QUICKSILVER and beryllium copper scrap urgently required, best prices, prompt cash. Sterling Products Ltd. Edmonton 4541 PBX. 293

WANTED, D.C. and A.C. ball-bearing motors, motor generator sets, dynamos and alternators. Full details to—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1.

17

WANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady St., Bethnal Green, London, E.1.

120

WANTED, rotary converters, any sizes.—Universal, 221 City Rd., London E.C.1. 35

WANTED, surplus stock cable, all types and sizes. We can inspect.—Box 220.

WANTED, 1,000-kW alternator, 8-pole, 750 r.p.m., for 3-phase, 50 cycles; preferably low tension, 440 volts.—Box 338.

WORK WANTED AND OFFERED

A.C. and D.C. motor rewinds and repairs. Prompt service, fully guaranteed.—Edgware 5566/9; Service Electric Co. Ltd., Honey-pot Lane, Stanmore, Middx.

92

PRODUCTION winding of armatures, stator, coils, transformers. Also special motors. Prompt and reliable deliveries.—Lewis Electric Motors Ltd., Moor Wks., Maidenhead, Berks. 104

EDUCATIONAL

CITY and Guilds (Electrical, etc.), on "No pass—No fee" terms. Over 95% successes. For details of modern courses in all branches of electrical engineering, applied electronics, automation, etc., send for our 148-page handbook—free and post free.—B.I.E.T. (Dept. 12a), 29, Wright's Lane, London, W.8.

100

BOOKS, INSTRUCTIONS, ETC.

"TELEVISION Engineering": Volume II: Video-Frequency Amplification. This volume describes the fundamental principles of video-frequency amplifiers and examines the factors which limit their performance at the extremes of the passband. A wide variety of circuits is described and particular attention is paid to the use of feedback. There is a section dealing with the special problems of camera-head amplifiers. 35s. net from all booksellers. By post 36s. 2d. from Iliffe Books Ltd., Dorset House, Stamford Street, London, S.E.1.

C5

An indispensable book for contractors . . .

MODERN ELECTRICAL CONTRACTING

HOW DOES one establish a footing in the ever-widening field of electrical contracting? More important—how does one become an efficient, well-organized contractor with a flourishing business and a reputation for good service?

This book by H. R. Taunton, A.M.I.E.E., gives all the facts in great detail. Every phase of contracting work is covered, from the first steps in founding or taking over a business.

The technicalities of electrical installation work are not discussed. "Modern Electrical Contracting" deals solely with the commercial side of a contracting business: its organization, economics, staff, premises, equipment, stores, stock, accounting, advertising and daily routine. Its value to the ambitious newcomer in the field needs no emphasis, but every established contractor would also do well to read and re-read it.

Published for Electrical Review 10s. 6d. net. By post 11s. 4d.

From all booksellers. Published by:

ILIFFE BOOKS LTD DORSET HOUSE STAMFORD STREET LONDON SE1



MEGOHMOID

insulating tape

Manufactured to the very highest standards including BS 1078, Megohmoid Adhesive Insulating Tape is one of the many Megohmoid products which serve the electrical industry. Samples and prices from the sole manufacturers.

Lindsay & Williams
LIMITED

OPENSHAW BRIDGE WORKS • MANCHESTER 11

Tel: EAST 2686 (5 lines) "Telex 66269". Cables: "Megohm Telex Manchester"

AC-Delco Division of General Motors Ltd.	84	E.D.L. Industries Ltd.	32	Microcell Ltd.	45	Scholes, Geo. H., & Co. Ltd.	110
Aberdale Cables Ltd.	Cover 1	Electrolite Ltd.	82	Midland Dynamo Co. Ltd.	24	Selex Electric Co. (Kirkby) Ltd.	Dom. Supp. 22
Acme Electrical Mfg. Co. (Tottenham) Ltd.	34	Electric Elements (Willenhall) Ltd.	Dom. Supp. 24	Midland Electric Mfg. Co. Ltd. ..	Cover 2	Simmonds & Stokes (Niphan) Ltd.	110
Aerialite Ltd.	37	Electro Methods Ltd.	15	N.S.F. Ltd.	51	Simplex Electric Co. Ltd.	91
Alan Industries Ltd.	8 & 9	Elliot Bros. (London) Ltd.	96	Nalder Bros. & Thompson Ltd. ...	69	Spencer Wire Co. Ltd.	68
Anglo-American Vulcanized Fibre Co. Ltd.	3	Ellison Geo. Ltd.	7	Neo Electrical Industries Ltd. ...	112	Standard Telephones & Cables Ltd.	71
Arcolec Switches Ltd. .. Dom. Supp. 9		Eltron (London) Ltd.	50	Nettfield & Moser Ltd.	56	Statter, J. G., & Co. Ltd.	65
Aron Motors Ltd.	4	English Electric Co. Ltd. ... 53, 64b & 93		New Switchgear Construction Co. Ltd.	44	Sterdy Telephones Ltd.	23
Asquith Electrics (Colne) Ltd.	40	Erskine, Heap & Co. Ltd.	47	Newton Bros. (Derby) Ltd.	80	Stewart Transformers Ltd.	50
Associated Electrical Industries Ltd.	5, 18 & 36	Evans, F. W., Ltd.	89	Ormond Engineering Co. Ltd.	75	Stone, J., & Co. (Deptford) Ltd. ...	76
Association of Steel Conduit Manufacturers	64	Exceal Metal Workers Ltd.	36	Pan American World Airways	27	Sturdy Electric Co. Ltd.	76
Atlas Lighting Ltd.	21	Expanded Metal Co. Ltd.	98	Paxtons (Electrical) Ltd.	78	Sutcliffe Speakman & Co. Ltd. ...	70
Backer Electric Co. Ltd. Cover 3		Federated Foundries Ltd. Dom. Supp. 21		Payne, P. P., & Sons Ltd.	52	Symonds, R. H., Ltd.	29
Bastian & Allen Ltd.	34	Ferranti Ltd.	41	Pelephone Ltd.	28	Taylor, Austin, Electrical Ltd.	80
Belling & Lee Ltd.	86	Formica Ltd.	46	Portable Furnace & Patents Co. ...	78	Telco Ltd.	112
Berry's Electric Magical Ltd. ... 64a & Dom. Supp. 1, 2, 3 & 4		Fractional H.P. Motors Ltd.	36	Power Centre Co. Ltd.	22	Tetra Eng. Co. Ltd. Dom. Supp. 15	
BIOC-Burnly Ltd.	85	Fuller Electric Ltd.	13	Precision Rubbers Ltd.	72	Texas Instruments Ltd.	62
Boby, W., Ltd.	26	G.W.B. Furnaces Ltd.	111	Precision Screw & Mfg. Co. Ltd. ...	90	Thompson Bros. (Engineers) Ltd. ...	76
Bowmaker (Plant) Ltd.	60	General Electric Co. Ltd. ... 59, 61 & 83		Pyrene Co. Ltd.	69	Transformer & Electrical Co. Ltd. ...	110
Bray, E. N., Ltd.	81	Gennisto Ltd.	44	Rawlings Mfg. Co. Ltd.	52	Trist, Ronald, & Co. Ltd.	20
British Driver-Harris Co. Ltd.	39	Gent & Co. Ltd.	14	Rawlplug Co. Ltd.	25	Universal Electrical Co.	112
British Insulated Callender's Cables Ltd.	11	Goodman, Geo., Ltd.	31	Reynolds, A., & Co. Ltd.	38	Utilities (London) Ltd.	55
British Klockner Switchgear Ltd. ...	78	Guide to Electrical Contractors. Regional 95, 96 & 97		Rist's Wires & Cables Ltd.	17	V.G. Porcelain Co. Ltd.	58
Brook Motors Ltd.	48 & 49	Hackbridge & Hewittic Electric Co. Ltd.	42	Robinson, Lionel, & Co. Ltd.	89	Vacitue Wire Co. Ltd.	58
Brush Electrical Eng. Co. Ltd. Cover 4		Ld.		Rowlands Electrical Accessories Ltd.	89	Vent-Axia Ltd.	63
C.N.S. Instruments Ltd.	55	Harbutt's Plasticine Ltd.	34	Ruberoid Co. Ltd.	29	Vulcanised Fibre Ltd.	10
Carr Fastener Co. Ltd.	43	Heatrae Ltd.	1	Runkben Electrical Products	34	Wade, Geo., & Son Ltd.	12
Cashmore, John, Ltd.	88	Heaven, Dowsett & Co. Ltd.	32	Sandra Ltd.	72	Wades (Halifax) Ltd.	26
Cass Electronics Ltd.	90	Horstmann Gear Co. Ltd.	6	Sanders, Wm., & Co. (Wednesbury) Ltd.	2	Wellings, Male & Co. Ltd.	30
Central Electricity Generating Board	94	Howells (Electric Motors) Ltd.	73	Sax, Julius, & Co. Ltd.	68	Wesser Industries (Poole) Ltd.	90
Channel Condensers Ltd.	74	I.A.C. Ltd.	32			Wootton & Co. Ltd.	23
Chilton Electric Products Ltd.	87	Iliffe Books Ltd. Dom. Supp. 24					
Connollys (Blackley) Ltd.	92	Imperial Aluminium Co. Ltd.	16				
Contractors, Electrical, Regional Guide to 95, 96 & 97		International Nickel Co. (Mond) Ltd.	79				
Craig & Donnicott Ltd.	30	Johnson, Matthey & Co. Ltd.	77				
Crater Products Ltd.	40	Kelvinator Ltd.	67				
Crompton Parkinson Ltd. 33 & 35		Lead Development Association	72				
Curtis Mfg. Co. Ltd.	32	Ley's Malleable Castings Co. Ltd. ...	54				
Daly (Condensers) Ltd.	54	Lindsay & Williams Ltd.	109				
De Berge Machine Tools Ltd.	74	Litholite Insulators & St. Albans Mouldings Ltd.	40				
Dimplex Ltd. Dom. Supp. 22		Londex Ltd.	112				
Donovan Electrical Co. Ltd.	112	M.T.E. Control Gear Ltd.	30				
Downes & Davies Ltd.	70	Martindale Electric Co. Ltd.	50				
Dzus Fastener Europe Ltd.	76	Mek-Elek Engineering Ltd.	78				
		Micanite & Insulators Co. Ltd.	66				

ADVERTISEMENT COPY AND BLOCKS

for printing in black and white should reach us 16 days preceding date of issue addressed to The Advertisement Department

ELECTRICAL REVIEW

Dorset House, Stamford Street, LONDON, S.E.1

DISTRIBUTION & POWER

TRANSFORMERS & CHOKES

Insist on

T.E.C



3 KVA - 100 KVA



25 VA - 2 KVA



UP TO 100 K.V.A.



1 KVA - 100 KVA



FLASH TESTER



250 VA - 2 K.V.A.



15-200 V.A.



10 KVA - 500 VA

AIR & OIL COOLED TYPES

Good Deliveries
Clean Design & Finish
Competitive Prices.

The TRANSFORMER & ELECTRICAL CO LTD

MANUFACTURERS OF POWER TRANSFORMERS UP TO 100 K.V.A etc.

HONYWOOD RD., BASILDON, ESSEX.

C.S.A. Approved - Catalogue on Request - Contractors to H.M. Government

TELEPHONE: BASILDON 20491-3

**WEATHERPROOF METAL-CLAD
SOCKETS, PLUGS, SWITCH SOCKETS etc.**
for all electrical purposes

REGD. TRADE MARK
NIPHAN

5-300 amp. 250-500 Volt

Plug

Hanging
through
Socket
& Cover

Plain
Socket

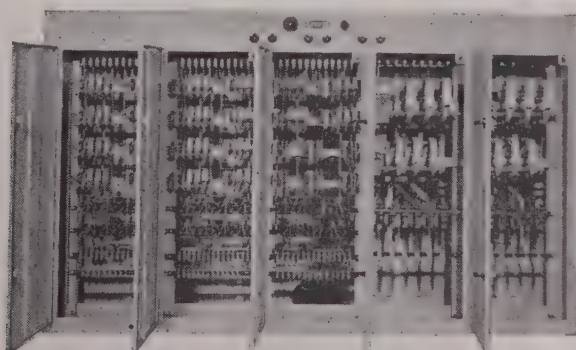
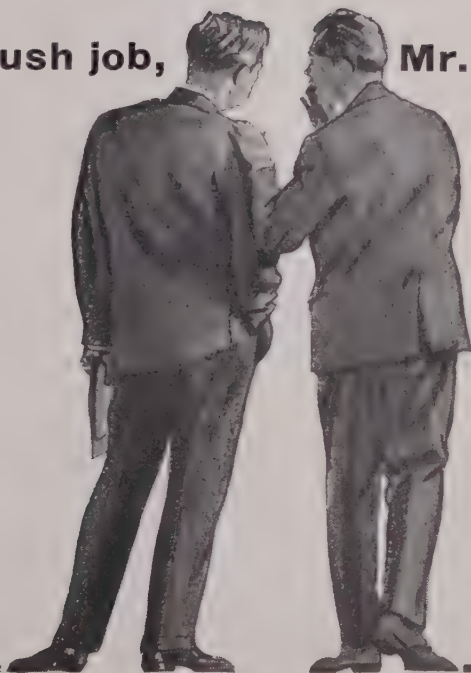
Flange
Plug & Cover

Flange Socket
and Cover

C. I.
Terminal
Plug &
Cover

SIMMONDS & STOKES (NIPHAN) LTD
MANUFACTURING ELECTRICAL ENGINEERS
Victoria House, Southampton Row, London, W.C.1. HOLborn 2163, 8637

"It's a very hush-hush job, Mr. Tomlinson"



*G.W.B. Resistance Furnace AC Contactor
Panel including auxiliary motor equipment*

A word leaking out in the wrong direction could upset years of work of design engineers. For a panel like this could double the output of canned soup, or increase foundry productivity. It could even be increasing the turnover of one of your competitors.

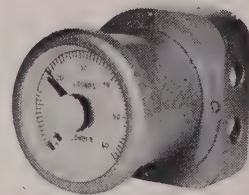
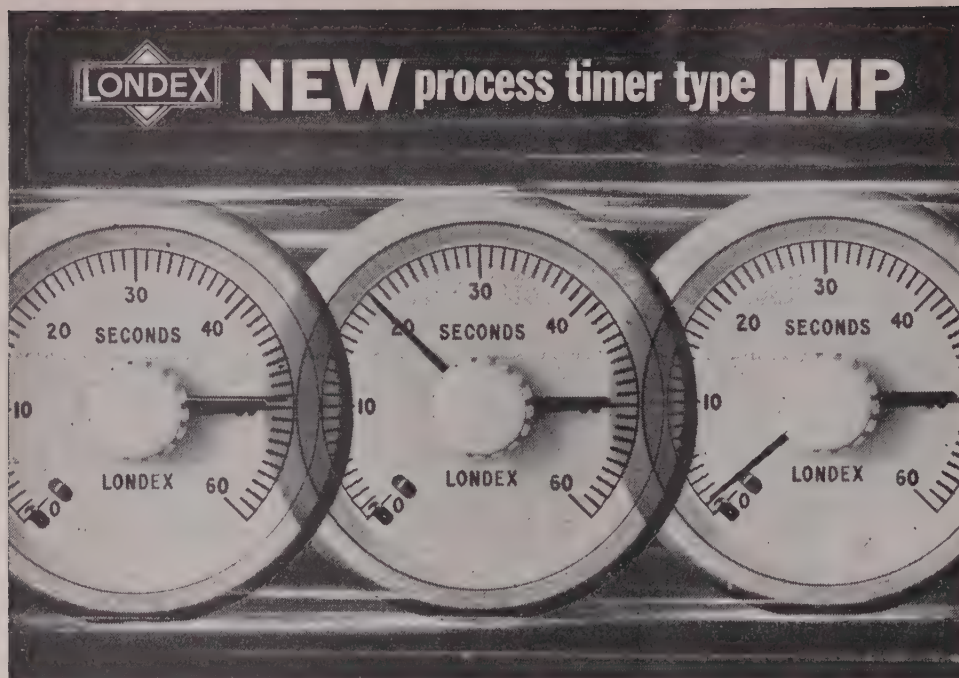
In paint, in steel, in plastics, in rubber . . . in virtually every industry . . . G.W.B. control boards are being put to constant use to improve production methods — increase productivity, speed output. Leading industries call in G.W.B. for advice. You could too.

GWB

CONTROL GEAR

G.W.B. FURNACES LIMITED (CONTROL GEAR DIVISION) • DUDLEY • WORCESTERSHIRE
TELEPHONE: DUDLEY 55455

ASSOCIATED WITH GIBBONS BROS., AND WILD-BARFIELD ELECTRIC FURNACES LIMITED



This timer offers a wide variety of contact arrangements without internal rewiring. It is self-resetting, can be started by a remote switch and is of medium price.

The IMP timer is available in two forms, flush mounting and wall mounting. The range includes timers to cover full scale times from 30 secs. with $\frac{1}{2}$ sec. settings, up to 24 hours with 20 min. settings—some of these available from stock.

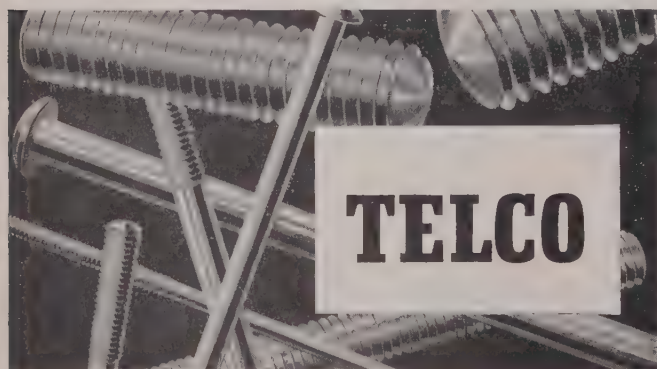
The timer is driven by a small but powerful self-starting synchronous motor working on 200/250v, A.C. 50 cycle supply. Contacts are rated at 2 amps 250v. A.C.

Write for list 186/ER

LONDEX LTD.

**ANERLEY WORKS,
LONDON, S.E.20**

Tel: SYDenham 3111 (5 lines)



Studding - Studs - Allthreads - Tie Rods
TELCO LTD., Alma Road, Enfield, Middx. HOWard 1282 (10 lines) Telex 21783
and 41-2 Ellis Street, Birmingham 1. Midland 7421/3

DONOVAN

ELECTRICAL WHOLESALERS

**For MOST INDUSTRIAL
and DOMESTIC ELECTRICAL
SUPPLIES**

THE DONOVAN ELECTRICAL CO. LTD.
(WHOLESALE DIVISION)
75-82 GRANVILLE STREET, BIRMINGHAM 1
DAY & NIGHT Tel. No.: MIDland 9441 (13 lines)



THE PERFECT FAULT FINDER

"NEO-MAINTEST"

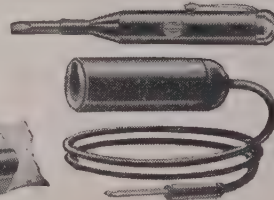
100/700 VOLTS
A.C./D.C. T104

WITH "HIGH
TENSION GUARD"
TESTS WITH SAFETY

12 kV

HT104

"SEARCH LEAD
WITH TEST PROD"
T104E

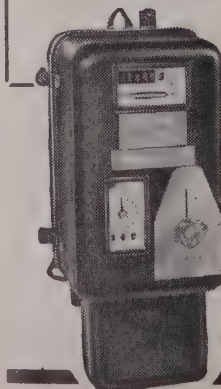


POTENTIAL INDICATORS MADE TO
MEET USERS' REQUIREMENTS

100% U.K. PRODUCTS

**NEO ELECTRICAL INDUSTRIES LTD.
MANCHESTER 4**

**HOUSE SERVICE
METERS**



Credit Pattern

and Prepayment Type

200-240 v. A.C. S/Ph 50c. (& D.C.)

AVAILABLE FROM STOCK

POLYPHASE 400-440 v. 3-wire Type

Ex Stock

UNIVERSAL ELECTRICAL CO.

217-221 City Road, London, E.C.1

DOMESTIC ELECTRICAL EQUIPMENT SUPPLEMENT

ELECTRICAL REVIEW

ELECTRIC
FIRES

7 JULY
1961

IT PAYS TO SELL THE BEST



GENUINE
MAGICOAL

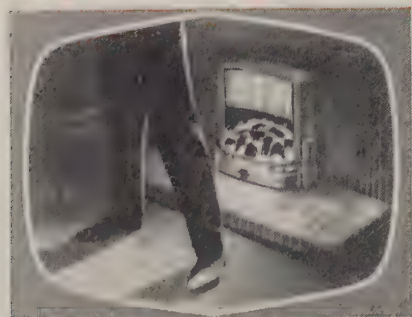
Regd. T.M.

FIRES MADE ONLY BY

Berry's

IT PAYS TO SELL THE BEST

especially when it's backed by big advertising!



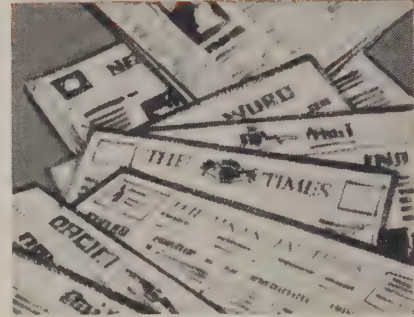
TELEVISION

From late September to early December a new version of the famous 'legs' commercial will be appearing nationally in Peak Time.



MAGAZINES

There will be full pages in colour in these top-quality magazines: Home, Homes and Gardens, House Beautiful, House and Garden, Ideal Home, Reader's Digest.



PRESS

In the Times and Financial Times, and in an impressive list of specialist journals, professional uses for Magicoal fires will be brought home to doctors, dentists, architects and others.

This advertising will carry the idea of Magicoal fires to thousands of people who pass your window. Stop them with an eye-catching display. Let them know that you are the man to see about a Magicoal fire.



Left:
CHARMBERRY
Price £10.10.1 + P.T. £2.0.1
= £12.19.6 (Tax paid)

Right:
WELLBERRY
Price £10.10.1 + P.T. £1.18.5
= £12.8.6 (Tax paid)

Below:
ALDERBERRY
Price £25.0.0 + P.T. £3.18.5
= £28.7.6 (Tax paid)



GENUINE
MAGICOAL

Regd. T.M.

Genuine Magicoal fires are made only by Berry's. There are more than 30 models, at prices from £11.15.0 to £95.17.6

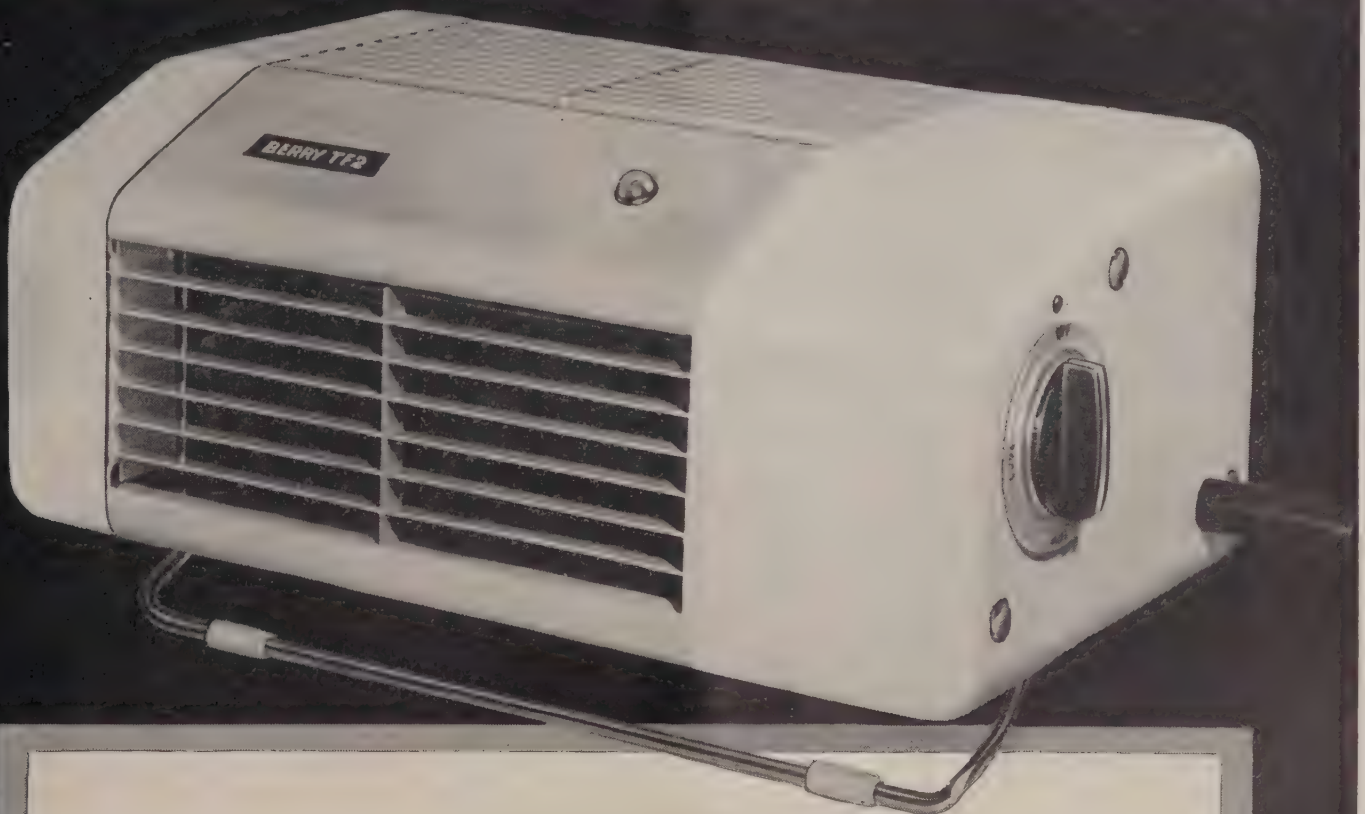
DISPLAY
AND SELL MORE

Berry's

PRODUCTS



THE BERRY TF2 Tangential Flow Heater



A neat new sales winner from Berry's. So efficient—it throws a beam of hot or cool air 15 feet. So versatile—it gives 'whole room heating' or cooling, dries hair or clothes, can be used on the floor, on the wall, on a polished desk or table. This is the Tangential Flow Heater with mass market appeal!

- * **SAFE** Double insulation with total enclosure of all working parts.
- * **SILENT** Due to the new helix element and specially angled blades and louvres.
- * **COMPACT** It measures only 12½" x 5½" x 7"
Weighs only 6½ lb.

FEATURES: Control switch for hot, cold or warm air. Automatic safety cut-out. Pilot light. 2kW A.C. only.

Price: £11.19.6 Tax paid.

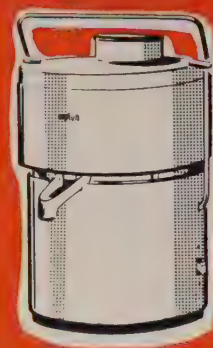


MULTIMIX

Beautifully designed Blender unit, with full range of attachments.

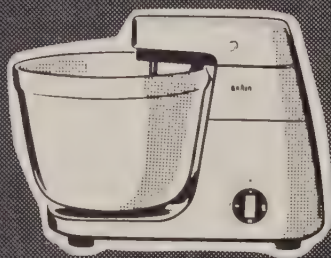
IT PAYS TO SELL THE BEST

Christmas, birthday, anniversary—there are many occasions nowadays when people go to their electrical dealer for a gift which is just a little extravagant. Sell them the best—they will never regret buying it.



MULTIPRESS

Last word in juice extractors for fruit and vegetables.

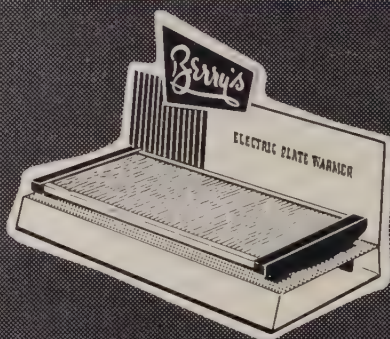


MAGICMAID

Superb food mixer with blender, slicer, shredder, juicer, grinder, mincer attachments

PLATE WARMER

For people who care about the way a meal is served.



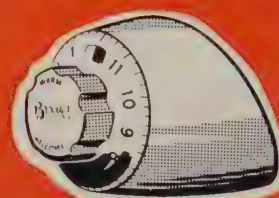
MAGICWARM

Electric blanket. Generous sizes (60" x 30" and 60" x 48"), meeting B.S.S. and guaranteed for 3 years.



ALADDIN

One of the many delightful lighting fittings, period and modern.



WARM-WELCOME

Time switch, for turning on any electrical appliance.

Let us help you to help yourself

We shall be glad to supply catalogues, printing blocks and display material from our Publicity Department, now in larger quarters at Wembley.

To avoid delay, please send or telephone your requests direct to Wembley and not to Touchbutton House.

BERRY'S ELECTRIC MAGICOAL LTD.

TOUCHBUTTON HOUSE, NEWMAN STREET, LONDON, W.1

Central Sales and Publicity: 2nd Way, Exhibition Grounds, Wembley Hill, Middlesex (WEM 3201)

DISPLAY AND SELL MORE

Berry's

PRODUCTS

ELECTRIC FIRES

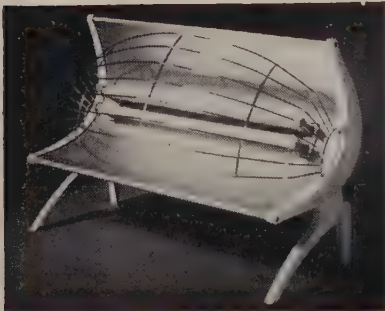
ACCORDING to a survey recently published by the Electricity Council the estimated number of householders in England and Wales in possession of at least one electric fire is in the region of 60 per cent. With an average loading per house of 1.6 kW (compared with 1.4 kW in 1955) the total installed space heating load now exceeds 20,000 MW. These figures demonstrate clearly the growing popularity of the electric fire and, should further proof be required, the number of fires, and manufacturers engaged in their production, listed in the following pages is itself an indication that this is one of the major forms of domestic appliance production.

The last few years have seen many changes in the design of electric fires and present-day models with their elegant styling and compact shapes are now more in demand than ever. Every style, ranging from the Jacobean and Georgian (for so many years a speciality of Berry's Electric) to the contemporary

models in gay coloured finishes are available. Apart from appearance, the improved forms of reflectors in the case of the radiant electric fire to ensure that heat is directed just where it is needed with the minimum of heat loss, has done much to meet the challenge of the oil-heater manufacturers, to say nothing of gas fires.

The quick response of the infra-red heater and its ability to beam heat over a wide angle has speeded the development of this form of heating over the past three years and now nearly every maker produces a model. Although originally designed for the bathroom, kitchen or nursery, there are now free standing and panel types and even infra-red heaters combined with an imitation fuel effect. It will be noted that convector heaters, fan heaters, oil filled radiators, etc., have not been included in the following pages: these will form the subject of our next survey to be published in our 11th August issue.

Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
A.E.I.-HOTPOINT, LTD., 33, Grosvenor Place, London, S.W.1.	"Hystan" 5551/2	Portable reflector	2 kW	Two 1 kW rod	Yellow and black, red and yellow	£5 0 7	£0 18 11
	"Jewel" 5510/2	Portable reflector	1 kW	One 1 kW rod	Cream, red or blue	£2 4 2	£0 8 4
	"Superglo" 6610 and 6620	Portable reflector	1 or 2 kW	One or two 1 kW rod	Silver grey, red, mushroom, bronze, blue or lilac	£2 16 10 (1 kW) £3 13 8 (2 kW)	£0 10 8 (1 kW) £0 13 10 (2 kW)
ARTIC FUSE & ELECTRICAL MFG. CO., LTD., Birtley, Co. Durham.	"Sunnyglow"	Portable, floodlit reflector	1½ or 1½ kW	One 1½ or 1½ kW rod	Gold, silver, ivory, blue or green to order	£5 4 0	£0 19 6
	"Sunglade"	Portable, floodlit reflector	2½ or 3 kW	Two 1½ or 1½ kW rod	Gold, silver, ivory, blue or green to order	£10 2 8	£1 18 0
BELLING & CO., LTD., Bridge Works, Southbury Road, Enfield, Middlesex. (continued on next page)	"Hotspur" 141 and 142	Portable reflector	1 or 2 kW	One or two 1 kW rod	Choice of three colours	£2 17 6 (141) £3 12 6 (142)	£0 10 7 (141) £0 13 4 (142)
	"Dinkie" 601 and 602	Portable firebar	1 or 2 kW	One or two 1 kW bar	Bronze	£1 17 6 (601) £3 0 0 (602)	£0 6 11 (601) £0 11 0 (602)
	"Empire" 402E and 403E	Portable firebar	2 or 3 kW	Two or three 1 kW bar	Beige	£4 0 0 (402E) £5 0 0 (403E)	£0 14 8 (402E) £0 18 4 (403E)

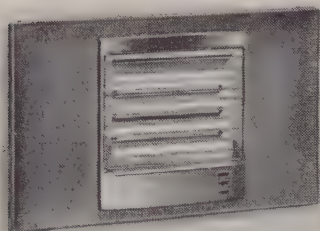


1

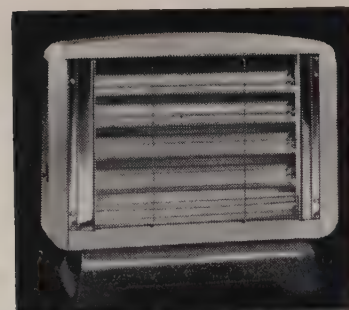
1. A.E.I.-Hotpoint 2 kW "Superglo"
2. Artic Fuse "Sunglade" floodlit portable fire



2



3



5

3. Belling model 180H horizontal wall-mounting "Corinthian" fire

4. Belling "Princess" coal-effect fire

5. Berry's "Silhouette" radiant fire

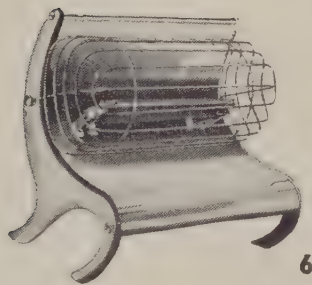


4

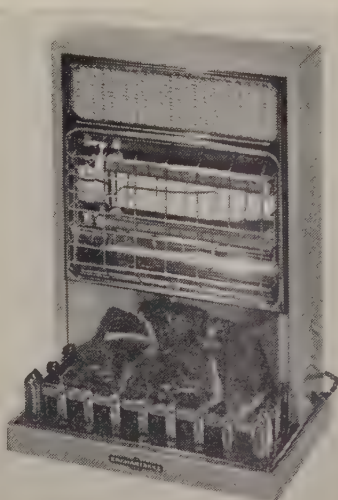
Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
BELLING & CO., LTD., Bridge Works, Southbury Road, Enfield, Middlesex. (continued)	"Solray" 151 and 152	Portable or wall mounting	1 or 2 kW	One or two 1 kW rod	Black and cream	£3 17 6 (151) £5 5 0 (152)	£0 14 3 (151) £0 19 3 (152)
	"Corinthian" 180 (A), 180F (B) and 180H (C)	Portable (A), wall mounting (B) and horizontal wall mounting (C)	3 kW	Three 1 kW rod	Choice of three colours	£16 8 0 (A and B) £18 0 0 (C)	£3 0 2 (A and B) £3 6 0 (C)
	"Countess" 233 and 234	Portable reflector	2 or 3 kW	Two or three 1 kW rod	Choice of six colours	£5 17 6 (233) £6 15 0 (234)	£1 1 7 (233) £1 4 9 (234)
	"Modern" 228	Portable reflector	2 kW	Two 1 kW rod	Choice of three colours	£7 2 6	£1 6 2
	"Homeguard" 155	Portable safety reflector	2 kW	Two 1 kW rod	Choice of two colours	£11 2 6	£2 0 10
	"Celtic" 753B	Period, log	3 kW	Three 1 kW bar (concealed)	Antique (rustless)	£29 15 0	£5 9 1
	"Adam" 743B	Period, coal	3 kW	Three 1 kW bar (concealed)	Armour bright (rustless)	£27 2 6	£4 19 6
	"Adam" 915 and 916	Period, firebar	2 or 3 kW	Two or three 1 kW bar	Armour bright (rustless)	£12 7 6 (915) £14 10 0 (916)	£2 5 5 (915) £2 13 2 (916)
	"Princess" 212 and 213	Imitation coal	2 or 3 kW	Two or three 1 kW rod	Choice of two colours	£10 10 0 (212) £11 10 0 (213)	£1 18 6 (212) £2 2 2 (213)
	"Princess" 212A and 213A	Imitation log	2 or 3 kW	Two or three 1 kW rod	Choice of two colours	£11 0 0 (212A) £12 0 0 (213A)	£2 0 4 (212A) £2 4 0 (213A)
	"Medieval" 640 and 640A	Imitation coal (640) or log (640A)	3 kW	Three 1 kW bar	Antique (rustless)	£15 10 0 (640) £17 7 6 (640A)	£2 16 10 (640) £3 3 9 (640A)
	"Medieval" 639 and 639A	Imitation coal (639) or log (639A)	2 kW	Two 1 kW bar	Antique (rustless)	£13 12 6 (639) £15 7 6 (639A)	£2 10 0 (639) £2 16 5 (639A)
	"Waverley" 264	Imitation coal, reflector	3 kW	Three 1 kW rod	Choice of three colours	£18 17 6	£3 9 3
	"Melrose" 274	Illuminated, reflector	3 kW	Three 1 kW bar or rod	Choice of two colours	£16 17 6	£3 1 11
	"Converta" 178 and 179	Fireplace screen, firebar (178) or reflector (179)	2 kW	Two 1 kW bar or rod	Ripple bronze	£7 17 6 (178) £8 7 6 (179)	£1 8 11 (178) £1 10 9 (179)

Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
BELLING & CO., LTD., Bridge Works, Southbury Road, Enfield, Middlesex. (continued)	"Hearth" 159 and 159A	Imitation coal (159) or log (159A)	2 kW	Two 1 kW bar	Bright (rustless) or bronze	£8 10 0 (159) £10 7 6 (159A)	£1 11 2 (159) £1 18 1 (159A)
	C/1/131 and C/2/132	Panel, bronze inset	1 or 2 kW	One or two 1 kW bar	Choice of six colours (panels)	£3 8 0 (C/1/131) £4 15 0 (C/2/132)	£0 12 6 (C/1/131) £0 17 5 (C/2/132)
	C/2A/132	Panel, chromium inset	2 kW	One or two 1 kW bar	Choice of six colours (panels)	£5 13 0	£1 0 9
BERRY'S ELECTRIC MAGICOAL, LTD., Touchbutton House, Newman Street, London, W.1. (continued on next page)	"Adjustaberry" 457	Imitation fuel	2½ kW	Two 1½ kW bar	Armour bright	£13 0 0	£2 7 6
	"Alderberry" 110	Imitation fuel	2 kW	Two 1 kW rod	Armour bright	£21 9 1	£3 18 5
	"Berrylog" A.21/O	Imitation fuel	1½ kW	Two ¾ kW bar	Satin antique	£10 12 8	£1 18 10
	"Berrylog" A.21/S	Imitation fuel	1½ kW	Two ¾ kW bar	Satin antique	£9 18 8	£1 16 4
	"Masterberry" 444	Imitation fuel	2 kW	Four ½ kW rod	Warm silver	£16 5 1	£2 19 5
	"Mayberry" 441 (a) and 451 (b)	Imitation fuel	2 kW (a) 3 kW (b)	Two (a) or three (b) 1 kW rod	Warm silver	£13 3 9 (a) £14 14 2 (b)	£2 8 3 (a) £2 13 10 (b)
	"Woodberry" 406	Imitation fuel	3 kW	Two 1½ kW bar	Armour bright	£17 4 6	£3 3 0
	"Adam Shell" 8	Imitation fuel	3 kW	Two 1½ kW rod	Antique bright (rustless)	£48 1 1	£9 7 5
	"Fleur-de-Lis" 40	Imitation fuel	3 kW	Two 1½ kW rod	Armour bright	£40 2 11	£7 16 7
	"Georgian" 2	Imitation fuel	3 kW	Two 1½ kW rod	Antique bright (rustless)	£42 6 10	£8 5 2
	"Jacobean" 5	Imitation fuel	3 kW	Two 1½ kW rod	Armour bright	£32 17 4	£6 8 2
	"Queen Anne" Pedestal II	Imitation fuel	3 kW	Two 1½ kW rod	Antique bright (rustless)	£52 11 0	£10 5 0
	"Regency" 20	Imitation fuel	2 kW	Two 1 kW rod	Antique bright (rustless)	£41 16 0	£8 3 0
	"Wilton" 42	Imitation fuel	3 kW	Two 1½ kW rod	Antique bright (rustless)	£80 4 7	£15 12 11
	"Berrylog" A.28 (Special 36in)	Imitation fuel	—	Log effect only	—	£12 15 8	£2 9 10
	"Berrylog" A.28 (Standard 24in)	Imitation fuel	—	Log effect only	—	£8 19 11	£1 15 1
	Curb Heater 457	Radiator	2½ kW	Two 1½ kW bar	—	£7 13 2	£1 9 10
	Curb Heater 98D	Radiator	2½ kW	Two 1½ kW bar	—	£8 19 11	£1 15 1
	Curb Heater 98E/2	Radiator	2 kW	Two 1 kW bar	—	£9 15 5	£1 18 1
	Curb Heater 98E/2½	Radiator	2½ kW	Two 1½ kW bar	—	£11 15 2	£2 5 10
	"Charmberry" 454	Imitation fuel	2 kW	Two 1 kW rod	Warm silver	£10 19 5	£2 0 1
	"Charmberry" 550	Imitation fuel	3 kW	Three 1 kW rod	Warm silver	£12 9 10	£2 5 8
	"Wellberry" 473	Imitation fuel	2 kW	Two 1 kW bar	Hammered finish	£10 10 1	£1 18 5

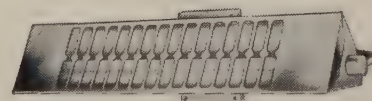
Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
BERRY'S ELECTRIC MAGICOAL, LTD., Touchbutton House, Newman Street, London, W.1. (continued)	"Studio" 633	Portable radiator	2 kW	Two 1 kW rod	Silver rose with cherry legs and handle	£5 1 0	£0 18 6
	"Chameleon" 490 and 492	Colour changing electric fireplace	2 kW	"Paravec" special	—	£31 5 1 (490) £33 14 11 (492)	£6 1 11 (490) £6 11 7 (492)
	"Silhouette" 352	Portable radiator	2 kW	"Paravec" special	Silver rose with gunmetal base	£10 10 6	£1 18 6
	"Mistoberry" 382 and 386	Fixed colour electric fireplace	2 kW	"Paravec" special	—	£27 0 2 (382) £29 9 2 (386)	£5 5 4 (382) £5 14 10 (386)
	Panel 597	Wall mounting radiator	2 kW	"Paravec" special	Silver rose	£9 19 6	£1 16 6
CARRON COMPANY, Carron, Falkirk.	"Curtsey"	Portable reflector	1 or 2 kW	One or two 1 kW rod	"Carrontine"	£2 2 6 (1 kW) £3 1 6 (2 kW)	£0 7 9 (1 kW) £0 11 3 (2 kW)
	"Precentor"	Portable reflector	1 or 2 kW	Two 1 kW rod	"Carrontine," cream and gold	£3 16 0 (1 kW) £4 17 0 (2 kW)	£0 13 11 (1 kW) £0 17 9 (2 kW)
	"Firebird"	Portable firebar	1 kW	One 1 kW spiral	"Carrontine," various finishes	£2 15 0	£0 10 1
CHATWINS, LTD., Albion Street, Tipton, Staffs.	"Enchantress"	Imitation coal effect	2 kW	Two 1 kW rod	Gold hammered or silver grey	£10 2 6	£1 17 1
CO-OPERATIVE WHOLESALE SOCIETY, LTD., National Works, Hall Street, Dudley, Worcs.	"Avon"	Portable firebar	1 or 2 kW	One or two 1 kW bar	Grey or green	£1 7 3 (1 kW) £2 4 3 (2 kW)	£0 5 0 (1 kW) £0 8 1 (2 kW)
	"Eden"	Portable firebar	1 or 2 kW	One or two 1 kW bar	Grey or green	£1 18 0 (1 kW) £2 18 0 (2 kW)	£0 7 0 (1 kW) £0 10 7 (2 kW)
	"Windsor"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Honey-dew or copper lustre	£3 0 0 (1 kW) £5 4 3 (2 kW)	£0 11 0 (1 kW) £0 19 1 (2 kW)
	"Derwent"	Portable reflector	1 kW	One 1 kW rod	Chromium	£1 14 2	£0 6 3
	"Invincible"	Portable reflector	750 or 1,500 W	One or two 750 W rod	Red, cream or yellow	£1 3 2 (750 W) £2 0 0 (1,500 W)	£0 4 3 (750 W) £0 7 4 (1,500 W)
	Bowl	10in portable reflector	600 W	One 600 W spiral	Chromium reflector	£1 16 3	£0 6 8



6



7



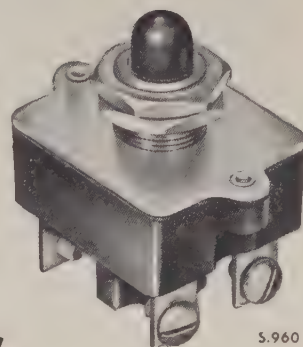
8

6. Carron "Curtsey" reflector fire
 7. Chatwins "Enchantress" coal effect fire
 8. "Nichro" model 448 infra-red wall fire (Cranmer & Cheshire)

Arcoelectric

Switches

Neon Signal Lamps



S.960

S.L.160, S.L.162 and S.L.163

New miniature low cost Neon Signal lamps.
 $\frac{1}{2}$ " hole fixing. All completely waterproof.
 The S.L.163 has small front of panel projection.

C.S.200: 15-AMP Rotary Cooker Switch.
 Double Pole three "heat" and "off".

S.L.50: Neon Signal Lamp with snap-in fixing.

M.30: 10-AMP Toggle Switch.

S.L.190: New Snap-in fixing Neon Signal Lamp

S.254: AC only 10-AMP Toggle Switch, double pole.

S.250: A single pole version of the S.254.

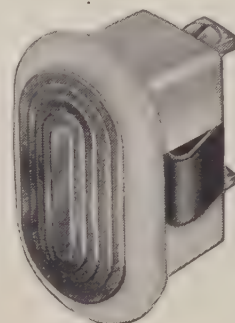
S.960: New Spin Drier Switch, double pole.



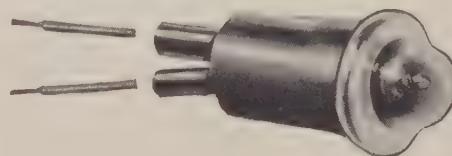
S.L.160



S.L.162



S.L.50

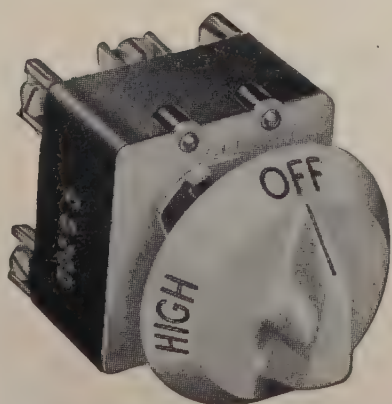


S.L.190

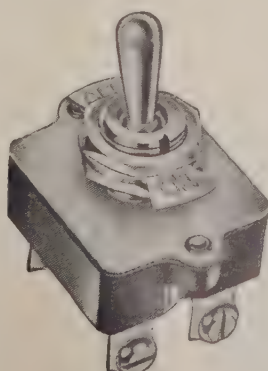
Write for Catalogue No. 132

Arcoelectric Switches Ltd.

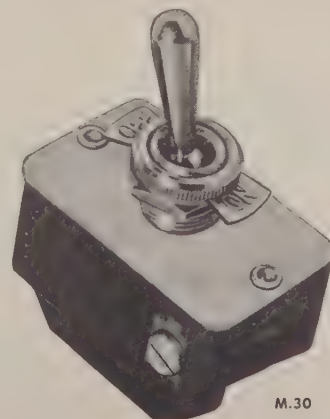
Central Avenue - West Molesey - Surrey - Tel: Molesey 3232



C.S.200



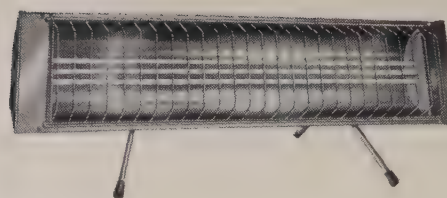
S.254



M.30



9



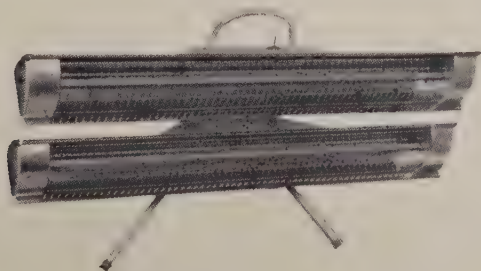
10

9. Ekco "Flamera" coal-effect fire

10. Dimplex model IRF.2250 2½ kW portable infra-red fire

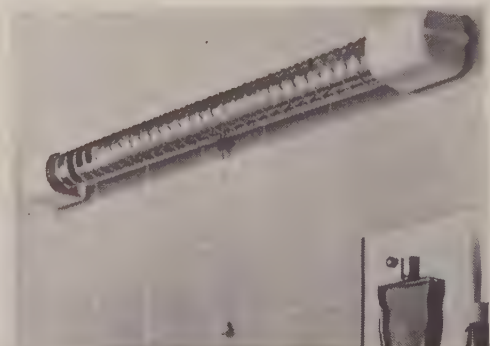
Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
CRANMER & CHESHIRE, LTD., Steward Street, Spring Hill, Birmingham, 18.	"Nichro" 450	Portable tilting reflector	1 or 2 kW	One or two 1 kW rod	Silver grey or cream	£3 8 4 (1 kW) £4 4 6 (2 kW)	£0 12 6 (1 kW) £0 15 5 (2 kW)
	"Nichro" 424	Portable double tilting reflector	2 kW	Two 1 kW rod	Silver grey	£5 15 6	£1 1 1
	"Nichro" 453	Portable tilting reflector	¾ or 1½ kW	One or two ¾ kW rod	Silver grey or cream	£3 2 6 (¾ kW) £3 15 6 (1½ kW)	£0 11 6 (¾ kW) £0 13 10 (1½ kW)
	"Nichro" 438	Portable tilting reflector with glow lamp behind grille	2 kW	Two 1 kW rod	Silver grey	£6 0 9	£1 2 1
	"Nichro" 451	Wall fixing	1 kW	One 1 kW rod	Cream enamelled or silver grey	£3 9 10	£0 12 10
	"Nichro" 452	Wall fixing	¾ kW	One ¾ kW rod	Cream enamelled or silver grey	£3 6 2	£0 12 2
	"Nichro" 448	Wall fixing	¾ or 1 kW	One ¾ or 1 kW rod	Cream and gold	£2 19 0 (1 kW) £3 7 0 (with switch)	£0 10 10 (1 kW) £0 12 3 (with switch)
	"Nichro" 454	Portable, non-tilting reflector	1 or 2 kW	One or two 1 kW rod	Silver grey or cream	£2 13 0 (1 kW) £3 9 0 (2 kW)	£0 9 8 (1 kW) £0 12 8 (2 kW)
R. & A. G. CROSSLAND, LTD., 55, Ebury Street, London, S.W.1.	"Raydant" 800/1	Portable reflector	1 kW	One 1 kW rod	Cream	£2 8 6	£0 8 9
	"Raydant" 800/2	Portable reflector	2 kW	Two 1 kW rod	Cream	£3 1 6	£0 11 1
DIMPLEX, LTD., Millbrook, Southampton.	IRD.750/S	Wall mounting	750 W	One 750 W infra-red spiral	Stove enamelled, various colours	£4 15 0	£0 17 6
	IRF.750	Portable	750 W	One 750 W infra-red spiral	Chromium reflector with cream stand or copper reflector with cream or black stand	£5 0 0	£0 18 3
	IRF.1500	Portable	1,500 W	Two 750 W infra-red spirals		£8 8 0	£1 10 9
	IRF.2250	Portable	2,250 W	Three 750 W infra-red spirals	Chromium reflector with gold stove enamelled body	£6 10 0	£1 3 9
EKCO HEATING & ELECTRICAL, LTD., 5, Vigo Street, London, W.1.	"Minora 20" VF2	Low level wall mounting reflector	1 or 2 kW	One or two 1 kW rod	Bronze enamel, chromium or copper reflector	£3 15 0	£0 13 7
	"Flamera" DF2	Reflector, imitation coal	1 or 2 kW	One or two 1 kW rod	Bronze enamel with copper reflector or silver enamel with chromium reflector	£12 10 0	£2 5 2
	"Firestreak" FS75 and FS75/S	Wall mounting	750 W	Infra-red spiral in silica tube	Chromium reflector, coloured end caps	£3 10 0 (FS75) £4 0 0 (FS75/S-with switch)	£0 12 8 (FS75) £0 14 6 (FS75/S-with switch)

Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
EKCO HEATING & ELECTRICAL, LTD., 5, Vigo Street, London, W.1. (continued)	"Radiant K" RKC25	Portable convector/radiant fire	1 kW radiant, 1½ kW convector	One 1 kW infra-red spiral and one 1½ kW black heat	Hammered bronze, gold colour outlet grille and reflector. (Ivory at slight extra cost)	£10 0 0	£1 16 2
	"Corona" CH2 and CH3	Coal effect	2 or 3 kW	Two or three 1 kW rod	Hammered bronze, chromium plated reflector	£10 19 3 (2 kW) £11 14 8 (3 kW)	£1 18 3 (2 kW) £2 2 10 (3 kW)
ELECTROWAY HEATERS, LTD., Rosebery Street, Loughborough, Leics.	IR12 and VH2	Inset, vertical reflector	1 and 2 kW	One or two 1 kW rod	Chromium	£2 16 6 (IR12) £4 3 0 (VH2)	£0 10 4 (IR12) £0 15 3 (VH2)
	2A2	Inset, parabolic reflector	2 kW	Two 1 kW rod	Chromium	£7 15 0	£1 8 5
	IHIR, IH2R and IH3R	Inset, horizontal reflector	1, 2 and 3 kW	One, two or three 1 kW rod	Chromium	£3 8 6 (IHIR) £4 14 6 (IH2R) £7 13 6 (IH3R)	£0 12 7 (IHIR) £0 17 4 (IH2R) £1 8 2 (IH3R)
	IH1, IH2 and IH3	Inset, panel bar	1, 2 and 3 kW	One, two or three 1 kW bar	Chromium	£3 1 0 (IH1) £4 2 0 (IH2) £6 11 6 (IH3)	£0 11 2 (IH1) £0 15 0 (IH2) £1 4 0 (IH3)
	IEIR, IE2R and IE3R	Inset horizontal reflector	1, 2 and 3 kW	One, two or three 1 kW rod	Stoved enamel	£2 9 0 (IEIR) £3 11 6 (IE2R) £5 18 0 (IE3R)	£0 9 0 (IEIR) £0 13 1 (IE2R) £1 1 8 (IE3R)
	IGIR and IG2R	Wall, horizontal reflector	1 and 2 kW	One or two 1 kW rod	Stoved enamel	£3 1 0 (IGIR) £4 6 0 (IG2R)	£0 11 2 (IGIR) £0 15 9 (IG2R)
	IG1 and IG2	Wall, panel bar	1 and 2 kW	One or two 1 kW bar	Stoved enamel	£2 16 0 (IG1) £3 11 0 (IG2)	£0 10 3 (IG1) £0 13 0 (IG2)
	WIR12 and WVH2	Wall, vertical reflector	1 and 2 kW	One or two 1 kW rod	Chromium, stoved enamel plaque	£4 7 0 (WIR12) £5 13 6 (WVH2)	£0 16 0 (WIR12) £1 0 10 (WVH2)
	WH2	Wall, panel bar	2 kW	Two 1 kW bar	Chromium, stoved enamel plaque	£5 12 6	£1 0 8
	WH2R	Wall, horizontal reflector	2 kW	Two 1 kW rod	Chromium, stoved enamel plaque	£6 6 0	£1 3 1
	WE2	Wall, panel bar	2 kW	Two 1 kW bar	Stoved enamel fire and plaque	£4 14 6	£0 17 4
	WE2R	Wall, horizontal reflector	2 kW	Two 1 kW rod	Stoved enamel fire and plaque	£5 3 0	£0 19 0
ENGLEHARD HANOVIA LAMPS, Bath Road, Slough, Bucks. (continued on next page)	"Radisil" 58	Wall mounting	600 or 800 W	One 600 or 800 W infra-red spiral	Cream stove enamelled. Chromium reflector (a). Gold-plated reflector (b)	£4 15 0(a) £5 10 0(b)	£0 17 0(a) £1 0 8(b)
	"Radisil" 32	Wall mounting	1,600 W	One 1,600 W infra-red spiral	Cream stove enamelled. Chromium reflector (a). Gold-plated reflector (b)	£8 10 0(a) £9 10 0(b)	£1 11 11(a) £1 15 8(b)



11

11. Englehard Hanovia model 66 "Radisil" floor standing infra-red fire

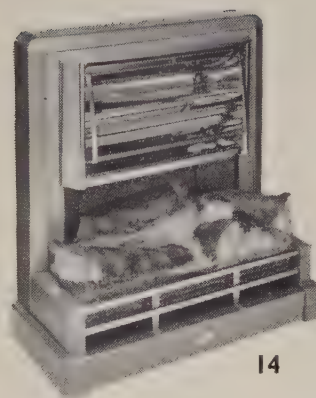


12

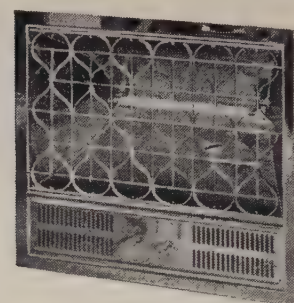
12. Ekco Heating "Firestreak" wall mounting infra-red fire



13



14



15



16

13. Falk, Stadelmann model U.95764 wall mounting "Supersil" infra-red panel heater

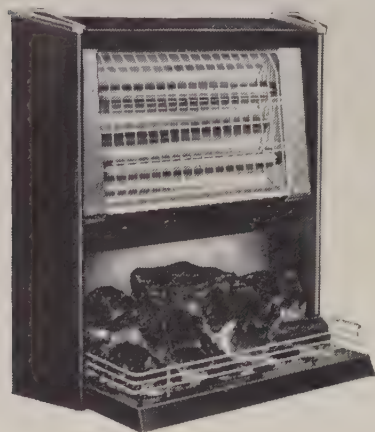
14. H. Frost & Co.'s model 302 log-effect fire

15. Ferranti model P.3310 panel fire

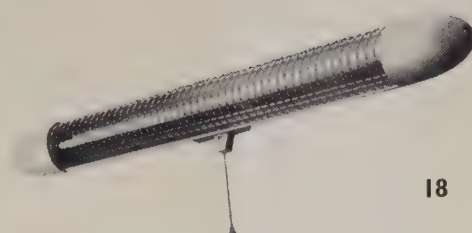
16. Falkirk Iron Co.'s "Belford" wall mounting fire

Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
ENGLEHARD HANOVIA LAMPS, Bath Road, Slough, Bucks. (continued)	"Radisil" 33	Portable	600 or 800 W	One 600 or 800 W infra-red spiral	Cream stove enamelled. Gold-plated reflector	£7 0 0	£1 6 3
	"Radisil" 66	Portable	1,200 or 1,600 W	Two 600 or 800 W infra-red spirals	Cream stove enamelled. Gold-plated reflectors	£11 0 0	£2 1 3
FALK, STADELMANN & CO., LTD., 91, Farringdon Road, London, E.C.1.	"Felicity" U.95704	Portable reflector illuminated screen	2 kW	Two 1 kW rod	Polychromatic gold	£7 15 0	£1 8 4
	"Comet" U.95751 U.95752	Portable reflector	1 or 2 kW	One or two 1 kW rod	Off-white, cardinal red and black or blue	£2 4 0 (1 kW) £3 4 0 (2 kW)	£0 8 1 (1 kW) £0 11 9 (2 kW)
	"Meteor" U.95745 U.95746	Portable reflector	1 or 2 kW	One or two 1 kW rod	Hollyhock and lilac, cardinal red/cream, mocha/cream, gun-metal/cloud grey	£3 7 6 (1 kW) £4 4 0 (2 kW)	£0 12 4 (1 kW) £0 15 4 (2 kW)
	U.95773 "Falcon"	Wall mounting infra-red reflector	750 W	One 750 W silica tube encased spiral	Ivory, complete with double pole on/off cord switch	£4 4 3	£0 15 3
	U.95766 "Supersil"	Wall mounting infra-red reflector	1,500 W	One 1,500 W silica tube encased spiral	Cream or cardinal red, complete with double pole on/off cord switch	£8 10 0	£1 11 1
	U.95765 "Supersil"	Portable infra-red reflector	2½ kW	Three 750 W silica tube encased spiral	Red/gold, black-gold, independently switched elements	£11 16 8	£2 3 3
	U.95764 "Supersil"	Wall mounting infra-red reflector	2½ kW	Three 750 W silica tube encased spiral	Red/ivory, grey/ivory, independently switched elements	£12 1 0	£2 4 1
FALKIRK IRON CO., LTD., 28, Brook Street, London, W.1.	39	Portable reflector	1 kW	One 1 kW rod	Stove enamelled, various colours	£2 4 6	£0 8 2
	41	Portable reflector	2 kW	Two 1 kW rod	Stove enamelled, various colours	£3 2 6	£0 11 5
	"Firefly" 43	Portable reflector	1 kW	One 1 kW rod	Stove enamelled, various colours	£2 4 6	£0 8 2
	"Belford"	Inset, wall mounting	1 or 2 kW	One or two 1 kW rod	Copper "Alisheen" front and sides, chromium reflector	£4 15 0 (1 kW) £5 5 0 (2 kW)	£0 17 4 (1 kW) £0 19 2 (2 kW)

Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
FALKIRK IRON CO., LTD., 28, Brook Street, London, W.1. (continued)	" Belford "	Semi-inset, wall mounting	1 or 2 kW	One or two 1 kW rod	Copper " Alisheen " front and sides, chromium reflector	£5 9 0 (1 kW)	£1 0 0 (1 kW)
						£5 19 0 (2 kW)	£1 1 9 (2 kW)
FERRANTI, LTD., Hollinwood, Lancs.	P.3310	Panel reflector, ventilating grille	2½ kW	Two 1½ kW rod	Chromium reflector and frame, Decorative screen £8 2s 6d extra	£35 10 0	£6 9 10
	P.33132	Panel reflector	2 kW	Two 1 kW rod	Chromium reflector, frame and guard, Decorative screen £7 extra	£23 10 0	£4 5 11
	P.33122	Panel reflector	1½ kW	Two ¾ kW rod	Chromium reflector, frame and guard, Decorative screen £5 15s 6d extra	£18 2 6	£3 6 3
H. FROST & CO., LTD., Walsall, Staffs.	261/2	Portable reflector	1 or 2 kW	One or two 1 kW rod	Stoved enamel	£2 8 4 (1 kW) £3 4 2 (2 kW)	£0 8 9 (1 kW) £0 11 7 (2 kW)
	302/3	Imitation coal effect	2 or 3 kW	Two or three 1 kW rod	Stoved enamel	£10 11 11 (2 kW) £11 12 7 (3 kW)	£1 18 1 (2 kW) £2 1 11 (3 kW)
	302/3	Imitation log effect	2 or 3 kW	Two or three 1 kW rod	Stoved enamel	£11 0 4 (2 kW) £12 1 1 (3 kW)	£1 19 8 (2 kW) £2 3 5 (3 kW)
	167 and 167S	Wall mounting	750 W	One 750 W infra-red spiral	Stoved enamel	£4 7 6 £4 15 0 (switched)	£0 15 10 £0 17 2 (switched)
	1167 and 1167S	Wall mounting	1 kW	One 1 kW infra-red spiral	Stoved enamel	£4 11 6 £4 19 0 (switched)	£0 16 6 £0 17 11 (switched)
	168 and 168S	Wall mounting	1,500 W	One 1½ kW infra-red spiral	Stoved enamel	£7 11 0 £7 17 6 (switched)	£1 7 3 £1 8 5 (switched)
	401/2	Wall panel	1 or 2 kW	One or two 1 kW rod	Stoved enamel	£2 14 8 (1 kW) £3 18 9 (2 kW)	£0 9 8 (1 kW) £0 14 3 (2 kW)
	403/4	Wall panel	1 or 2 kW	One or two 1 kW bar	Stoved enamel	£2 13 6 (1 kW) £3 12 6 (2 kW)	£0 9 8 (1 kW) £0 13 1 (2 kW)
	4020	Wall panel	2 kW	Two 1 kW rod	Stoved enamel	£6 0 9	£1 1 10
	602	Wall panel	2 kW	Two 1 kW rod	Stoved enamel	£4 10 10	£0 16 5
	7061	Wall panel	2 kW	Two 1 kW rod	Stoved enamel	£4 9 3	£0 16 1
	177	Inset	1 kW	One 1 kW rod	Stoved enamel (a) Chromium (b)	£2 5 2(a) £2 19 7(b)	£0 8 2(a) £0 10 9(b)
	A17	Inset	2 kW	Two 1 kW rod	Stoved enamel (a) Chromium (b)	£3 10 11(a) £4 19 3(b)	£0 12 10(a) £0 17 11(b)
	A14	Inset	1 kW	One 1 kW bar	Stoved enamel	£2 6 3	£0 8 4
	A24	Inset	2 kW	Two 1 kW bar	Stoved enamel	£3 5 8	£0 11 10
	4021	Inset	2 kW	Two 1 kW rod	Stoved enamel	£5 1 5	£0 18 4
	7021	Inset	2 kW	Two 1 kW rod	Stoved enamel (a) Chromium (b)	£7 10 0(a) £11 3 6(b)	£1 7 1(a) £2 0 4(b)
	7031	Inset	3 kW	Three 1 kW rod	Stoved enamel (a) Chromium (b)	£7 19 4(a) £11 12 10(b)	£1 8 9(a) £2 2 0(b)
GATEHILL BECO, LTD., Kennard Road, Stratford, E.15. (continued on next page)	" Becosil " 505	Wall mounting	750 W	One 750 W infra-red spiral	White and mushroom	£3 19 9	£0 13 11



17



18



19



20

17. Gatehill Beco "Coalglo" coal-effect fire
 18. Gatehill "Becosil 505" wall-mounted infra-red heater
 19. G.E.C. model 2810 free-standing screen fire
 20. G.E.C. model 2778 reflector fire

Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
GATEHILL BECO, LTD., Kennard Road, Stratford, E.15. (continued)	"Becosil" 707	Wall mounting	1 kW	One 1 kW infra-red spiral	White or mushroom. Gold plated guard	£4 15 0	£0 17 2
	"Becosil" 808	Portable	1 kW	One 1 kW infra-red spiral	White or mushroom. Chromium guard	£5 17 6	£1 1 6
	"Coalglo"	Imitation coal effect	2 or 3 kW	Two or three 1 kW rod	Black/gold or bronze/gold	£10 10 0 (2 kW) £11 10 0 (3 kW)	£1 18 6 (2 kW) £2 2 2 (3 kW)
	"Coalglo"	Imitation coal effect	2 kW	Two 1 kW infra-red spiral	Black/gold or bronze/gold	£11 10 0	£2 2 2
	"Log-Glo"	Imitation log effect	2 or 3 kW	Two or three 1 kW rod	Black/gold or bronze/gold	£11 0 0 (2 kW) £12 0 0 (3 kW)	£2 0 4 (2 kW) £2 4 0 (3 kW)
G.B.M. (ELECTRICAL) BIRMINGHAM, 439-443, Moseley Road, Birmingham, 12.	"Sunglow"	Wall or ceiling mounting	750 W (a) 1,000 W (b)	One infra-red spiral	Yellow, red, cream, gold or silver	£3 10 0 (a) £4 15 0 (b)	£0 11 4 (a) £0 15 5 (b)
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.	D.2810	Free-standing screen	2½ kW	One 500 W rod (radiant) 2 kW convection	Bronze/gold	£13 6 4	£2 8 8
	D.2819	Portable reflector	2 kW	Two 1 kW rod	Black and red	£5 9 11	£1 0 1
	D.2778	Portable reflector	2 kW	Two 1 kW rod	Cygnets/grey or flame/grey	£3 1 4	£0 11 2
	D.2824	Illuminated portable reflector	2 kW	Two 1 kW rod	Grey, terra cotta, red with frosted glass	£8 7 0	£1 10 6
	D.2865	Wall mounting	750 W	One 750 W infra-red spiral	Honeysuckle and old gold	£3 12 3	£0 13 3
GRUBB ENGINEERING CO., LTD., Mary Street, Birmingham, 12.	"Grubb"	Portable reflector	2 kW	Two 1 kW rod	Gilt or silver and cream	£3 7 6	£0 12 4
L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, London, W.C.2. (continued on next page)	LGH.800 and LGH.803	Imitation coal effect	2 kW (800) 3 kW (803)	Two or three 1 kW rod	Silver or gold	£10 2 6 (800) £11 10 10 (803)	£1 17 0 (800) £2 2 2 (803)

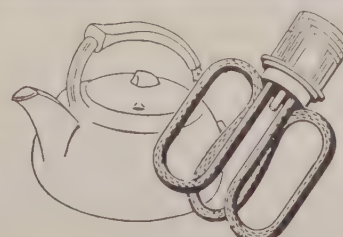
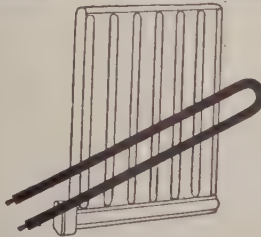
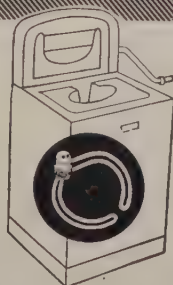
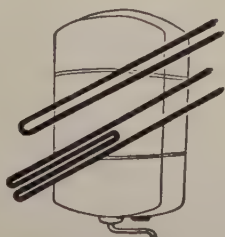
Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, London, W.C.2. (continued)	LGH.822 and LGH.833	Imitation coal effect	2 kW (822) 3 kW (833)	Two or three 1 kW rod	Silver or gold	£10 9 3 (822) £11 14 8 (833)	£1 18 3 (822) £2 2 10 (833)
	LGH.822G and LGH.833G	Imitation coal effect	2 kW (822G) 3 kW (833G)	Two or three 1 kW rod	Black, ivory and gold, Gold plated reflector	£13 6 4 (822G) £14 15 0 (833G)	£2 8 8 (822G) £2 13 11 (833G)
	"Florida" LGH.500	Combined reflector-convector	2½ kW	1 kW rod (radiant) 1½ kW convection	Golden bronze	£10 2 6	£1 17 0
	"Sunstreak" LGH.400	Wall mounting	750 W	One 750 W infra-red spiral	Golden bronze	£3 19 11	£0 14 7
HEATRAE, LTD., Heatrae Works, Norwich.	"Saferod"	Reflector, wall mounting	1 kW	One 1 kW embedded rod	Mushroom and chromium	£5 5 0	£0 19 3
	"Majestic"	Reflector, floor mounting	2 kW	Three 660 W embedded rod	Cameo fawn and pebble grey	£15 1 10	£2 15 2
	"Ballerina"	Reflector, floor mounting	2 kW	Three 660 W embedded rod	Cameo fawn and pebble grey	£14 4 0	£2 12 0
DAVID C. LESSER & CO., LTD., 510, Coventry Road, Birmingham, 10. (continued on next page)	R/E505	Portable screen reflector	2 kW	Two 1 kW rod	Gold, green and cream	£4 4 8	£0 15 4
	C 506	Imitation coal effect	2 kW	Two 1 kW rod	Hammered gold	£7 16 0	£1 8 6
	SH1 and SH2	Wall mounting	750 W	One 750 W infra-red spiral	Cream or off-white	£3 11 3 (SH1) £4 8 0 (SH2-with switch)	£0 12 9 (SH1) £0 15 10 (SH2-with switch)

Selected for their high efficiency and economy. Tetra Elements combine high dielectric strength and insulation resistance with good heat transfer and distribution.

TETRA FINROD elements for oil pre-heating; convection heating; infra-red drying of grain, rubber, tobacco, timber and many other applications; heat exchangers and defrosting of commercial refrigeration equipment.

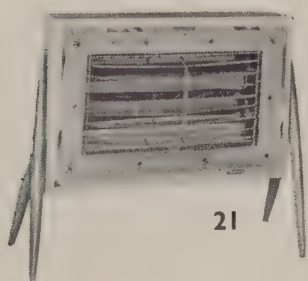
Plain or finned, Tetra elements efficiently heat water, air, oil, chemicals and metals.

Your enquiries are cordially invited



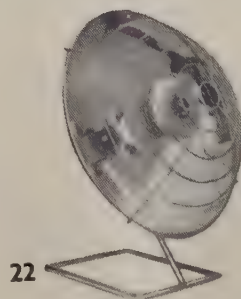
THE TETRA ENGINEERING CO. LTD. TETRA WORKS, NORTH END ROAD, WEMBLEY, MIDDX. Tel.: WEMBLEY 1066 (5 lines)

Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
DAVID C. LESSER & CO., LTD., 510, Coventry Road, Birmingham, 10. (continued)	R/T58/59	Portable reflector	1 and 2 kW	One or two 1 kW rod	Stoved enamel	£2 2 3 (1 kW) £2 16 8 (2 kW)	£0 7 8 (2 kW) £0 10 3 (2 kW)
	R1/F318 and R1/F320	Inset wall mounting	1 and 2 kW	One or two 1 kW rod	Stoved enamel, hammered	£1 19 4 (1 kW) £3 4 9 (2 kW)	£0 7 1 (1 kW) £0 11 8 (2 kW)
	RW/F304 and RW/F305	Rounded wall mounting	1 and 2 kW	One or two 1 kW rod	Stoved enamel, hammered	£2 10 6 (1 kW) £3 15 0 (2 kW)	£0 9 2 (1 kW) £0 13 7 (2 kW)
	WM/507 and WM508	Angled wall mounting	1 and 2 kW	One or two 1 kW rod	Stoved enamel, hammered	£2 6 9 (1 kW) £3 10 0 (2 kW)	£0 8 6 (1 kW) £0 12 8 (2 kW)
	708/2	Imitation coal effect	2 kW	Two 1 kW rod	Hammered gold or bronze	£11 0 0	£1 19 8
	708/3	Imitation coal effect	3 kW	Three 1 kW rod	Hammered gold or bronze	£11 0 0	£1 19 8
	M.33	Wrought iron screen	2 kW	Two 1 kW rod	Black/gold, white/gold or white/burgundy	£7 0 0	£0 19 6
	C/1302 and C/1301	Inset, wall mounting	1 or 2 kW	One or two 1 kW rod	All chrome on brass	£4 4 0 (2 kW) £2 16 4 (1 kW)	£0 15 2 (2 kW) £0 4 10 (1 kW)
LONOR, LTD., 1, Maddox Street, London, W.1.	"Siemens" SK15	Portable radiant heater	1½ kW	One 600 W and One 900 W rod	Brown/beige and blue/grey	£3 14 4	£0 13 5
	"Siemens" OFW1	Ceiling or wall mounting	1 kW	One 1 kW tubular sheathed	White enamelled base	£4 16 7	£0 17 5
	"Siemens" WST10A	Wall mounting	1 kW	One 1 kW rod	White enamelled	£2 10 8	£0 9 1
MATHEWS ELECTRIC, LTD., Endurance Works, Maypole Fields, Cradley, Staffs.	"Sunstreak"	Wall mounting	725 W	One 725 W infra-red spiral	Stoved enamel	£4 10 0	£0 16 6
METWAY ELECTRICAL INDUSTRIES, LTD., Canning Street, Kemp Town, Brighton, 7.	"Magnaway"	Portable reflector	2 kW	Two 1 kW rod	Mottled silver and chromium	£3 10 0	£0 12 7
	"Mirrorway"	Portable bowl	750 W	One 750 W spiral	Plain aluminium	£1 1 9	£0 3 11
	"Astroway"	Portable bowl	750 W	One 750 W spiral	Plain aluminium	£1 5 3	£0 4 7

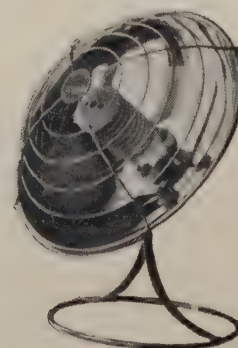


21

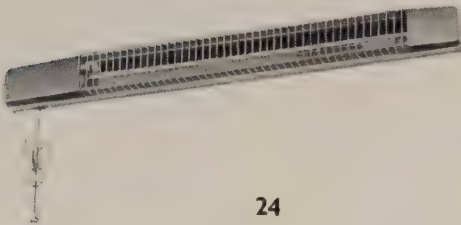
21. Heatrae "Ballerina" reflector fire
 22. Metway "Mirrorway 1000"
 1 kW bowl fire
 23. Metway "Superway New Style"
 600 W bowl fire



22



23



24



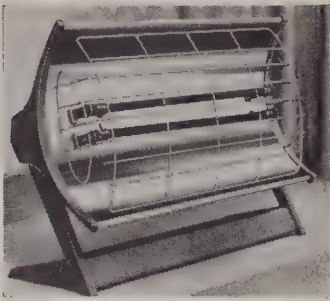
25



26

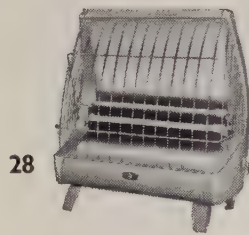
- 24. Morphy-Richards 750 W wall-mounting infra-red heater
- 25. T. B. Morley & Co.'s "Humber" reflector fire
- 26. Morphy-Richards 2 kW "Solway" coal-effect fire

Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
METWAY ELECTRICAL INDUSTRIES, LTD., Canning Street, Kemp Town, Brighton, 7. (continued)	"Mirrorway 1000"	Portable bowl	1 kW	One 1 kW spiral	Plain aluminium	£1 7 6	£0 5 0
	"Superway New Style"	Portable bowl	600 W	One 600 W spiral	Plain aluminium	£0 18 6	£0 2 8
	"Modernway One"	Portable reflector	1 kW	One 1 kW rod	Chromium and white enamel	£1 18 6	£0 7 0
	"Modernway Two"	Portable reflector	2 kW	Two 1 kW rod	Chromium and white enamel	£2 17 9	£0 10 5
	"Rioway"	Portable reflector	750 W	One 750 W rod	Chromium and beige	£2 2 4	£0 7 7
	"Rioway 1000"	Portable reflector	1 kW	One 1 kW rod	Chromium and beige	£2 7 6	£0 8 7
T. B. MORLEY & CO., LTD., Jameson Street, Hull.	"Don"	Portable reflector	750 W to 2 kW	One or two 750 W or 1 kW rod	Cream	£1 19 0 (750 W) £2 1 9 (1 kW) £2 8 6 (1½ kW) £2 12 9 (2 kW)	£0 7 1 (750 W) £0 7 7 (1 kW) £0 8 11 (1½ kW) £0 9 8 (2 kW)
	"Humber"	Portable reflector	750 W or 1,500 W	One or two 750 W rod	Cream	£2 0 0 (750 W) £2 8 6 (1½ kW)	£0 7 4 (750 W) £0 8 11 (1½ kW)
	"Derwent"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Cream	£2 0 9 (1 kW) £2 12 0 (2 kW)	£0 7 6 (1 kW) £0 9 6 (2 kW)
	"Thames"	Portable twin reflector	1,500 W	Two 750 W rod	Bronze	£1 15 9	£0 6 7
	"Severn"	Portable firebar	1 or 2 kW	One or two 1 kW bar	Bronze	£1 5 6 (1 kW) £1 18 3 (2 kW)	£0 4 8 (1 kW) £0 7 0 (2 kW)
	"Aire"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Cream	£2 0 0 (1 kW) £2 11 0 (2 kW)	£0 7 4 (1 kW) £0 9 4 (2 kW)
	"Morco" bowl	Portable reflector	600 W	One 600 W spiral	Cream	£1 8 6	£0 5 3
MORPHY-RICHARDS (CRAY), LTD., 50, Conduit Street, London, W.1. (continued on next page)	"Avon" FA/20	Portable reflector	2 kW	Two 1 kW rod	Pearl bronze, charcoal or ember red	£4 13 2	£0 16 10
	"Cray" FC/750 and FC/15	Portable reflector	750 W (FC/750) 1½ kW (FC/15)	One or two 750 W rod	Pearl bronze with red or pearl bronze with charcoal	£2 8 9 (FC/750) £2 19 4 (FC/15)	£0 8 9 (FC/750) £0 10 8 (FC/15)



27

27. Remploy 2 kW reflector fire
 28. Morphy-Richards "Avon" model FA/20 portable fire
 29. Newtherm "Economist" combined convector and infra-red heater



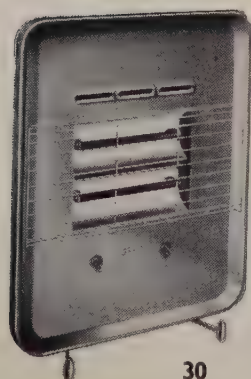
28



29

Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
MORPHY-RICHARDS (CRAY), LTD., 50, Conduit Street, London, W.1. (continued)	"Cray" FC/10 and FC/20	Portable reflector	1 kW (FC/10) 2 kW (FC/20)	One or two 1 kW rod	Pearl bronze with red or pearl bronze with charcoal	£2 12 11 (FC/10) £3 5 8 (FC/20)	£0 9 7 (FC/10) £0 11 10 (FC/20)
	IRA	Wall mounting	750 W	One 750 W infra-red	Off white/cinnamon or off white or charcoal/off white	£4 4 3	£0 15 3
	IRF	Portable free-standing	1 kW	One 1 kW infra-red	White with red, primrose or pale blue	£4 4 3 (provisional)	£0 15 3 (provisional)
	"Solway" SOL/20	Portable coal effect	2 kW	Two 1 kW rod	Pearl grey or charcoal with flame red fireback	£10 13 6	£1 18 6
NEWTHERM OIL BURNERS, LTD., Meadows Works, Fallings Park, Wolverhampton.	"Economist"	Combined radiant/convector	2,800 W	Two 400 W infra-red (radiant) 2 kW convection	Bronze and honey stoved enamel	£10 1 11	£1 17 0
P. & R. ELECTRICAL (LONDON), LTD., Pearl House, 1, Berrymead Gardens, Acton, W.3.	Elstein "Slim-Rad" 1	Wall or ceiling mounting	250 W and 400 W	Glazed, sealed ceramic infra-red	New copper, bronze gold, satin	£2 19 6 (250 W) £3 2 0 (400 W)	£0 10 11 (250 W) £0 11 4 (400 W)
	Elstein "Slim-Rad" 2	Wall or ceiling mounting	500 W and 800 W	Glazed, sealed ceramic infra-red	New copper, bronze gold, satin	£4 10 6 (500 W) £4 15 0 (800 W)	£0 16 7 (500 W) £0 17 4 (800 W)
	Elstein "Slim-Rad" 3	Wall or ceiling mounting	750 W and 1,200 W	Glazed, sealed ceramic infra-red	New copper, bronze gold, satin	£6 2 6 (750 W) £6 10 0 (1,200 W)	£1 2 5 (750 W) £1 3 9 (1,200 W)
REMPLOY, LTD., 415, Edgware Road, Cricklewood, London, N.W.2.	"Remploy" MH4/3, 4/4, 4/5 and 4/6	Portable reflector	750 W, 1 kW, 1½ kW and 2 kW	One or two 750 W or 1 kW rod	Stoved enamel, range of colours	£2 14 0 (750 W) £2 19 6 (1 kW) £3 6 0 (1½ kW) £3 12 3 (2 kW)	£0 9 11 (750 W) £0 10 11 (1 kW) £0 12 1 (1½ kW) £0 13 3 (2 kW)
REVO ELECTRIC CO., LTD., Groveland Road, Tipton, Staffs. (continued on next page)	"New Reflexam"	Wall mounting reflector	1 or 2 kW	One or two 1 kW rod	Artshade silver and chromium	£3 8 6 (1 kW) £4 12 6 (2 kW)	£0 12 6 (1 kW) £0 16 11 (2 kW)
	"Somerset"	Portable firebar	1 or 2 kW	One or two 1 kW bar	Grey, green, yellow or red	£3 12 6 (1 kW) £4 17 6 (2 kW)	£0 13 3 (1 kW) £0 17 10 (2 kW)
	"Wessex"	Portable screen	2 kW	Two 1 kW rod	Grey, stone, red or gold	£6 13 0 (small) £6 16 0 (large)	£1 4 4 (small) £1 4 11 (large)
	"New Tubula"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Artshade silver and chromium	£3 10 6 (1 kW) £4 15 0 (2 kW)	£0 12 11 (1 kW) £0 17 10 (2 kW)

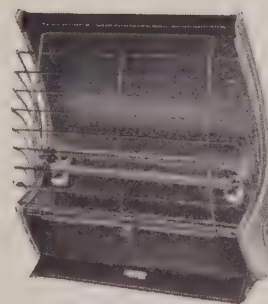
Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
REVO ELECTRIC CO., LTD., Groveland Road, Tipton, Staffs. (continued)	"Contemporary"	Direct wall mounting	2 kW	Two 1 kW rods or bars	Grey, stone, red or gold	£13 4 0 (bar) £13 4 0 (rod)	£2 8 3 (bar) £2 8 3 (rod)
	"Crescent"	Portable reflector	2 kW	Two 1 kW rod	Grey, stone, red or gold	£3 1 6	£0 11 3
	"Swallow"	Wall mounting reflector	1 kW	One 1 kW rod	Blue with grey or yellow with grey	£3 6 6	£0 12 2
	"Glo-ray"	Imitation coal effect	2 kW	Two 1 kW rod	Grey, stone, red or gold	£11 15 5	£2 3 1
	"New Inset"	Inset with slabbing frame	1 or 2 kW	One or two 1 kW bar	Grey, stone, red or gold	£2 4 6 (1 kW) £3 3 0 (2 kW)	£0 8 2 (1 kW) £0 11 6 (2 kW)
	"New Inset"	Inset with slabbing frame	1 or 2 kW	One or two 1 kW rod	Grey, stone, red or gold	£2 7 6 (1 kW) £3 9 0 (2 kW)	£0 8 8 (1 kW) £0 12 7 (2 kW)
	"New Outset"	Direct wall mounting	1 or 2 kW	One or two 1 kW rod	Grey, stone, red or gold	£2 11 0 (1 kW) £3 11 0 (2 kW)	£0 9 4 (1 kW) £0 13 0 (2 kW)
	"New Outset"	Direct wall mounting	1 or 2 kW	One or two 1 kW bar	Grey, stone, red or gold	£2 14 0 (1 kW) £3 17 0 (2 kW)	£0 9 11 (1 kW) £0 14 1 (2 kW)
	"Salisbury"	Convactor fire	1 or 2 kW	One or two 1 kW rod	Grey, stone, red or gold	£6 17 5 (1 kW) £8 2 9 (2 kW)	£1 5 1 (1 kW) £1 9 9 (2 kW)
	"Salisbury"	Convactor fire (thermostatic)	2 kW	Two 1 kW rod	Grey, stone, red or gold	£8 10 0	£1 11 0
	"Winchester"	Convactor and radiant fire	2 or 3 kW	Two or three 1 kW rod	Grey, stone, red or gold	£9 1 9 (2 kW) £10 16 3 (3 kW)	£1 13 3 (2 kW) £1 19 6 (3 kW)
	"Winchester"	Convactor and radiant fire (thermostatic)	2 or 3 kW	Two or three 1 kW rod	Grey, stone, red or gold	£9 9 6 (2 kW) £11 3 6 (3 kW)	£1 14 8 (2 kW) £2 0 10 (3 kW)
	"Regis"	Imitation coal effect	2 kW	Two 1 kW rod	Beige or old gold	£7 16 5	£1 8 7
SELEX ELECTRIC CO. (KIRKBY), LTD., Yardley Road, Kirkby Industrial Estate, Liverpool.	"Infralux"	Combined lighting and heating fitting	500 W	Two 250 W infra-red lamps	Pastel shades	£4 4 2	£0 15 4



30



31



32

30. Revo "Wessex" portable screen fire
 31. Selex "Infralux" heat-light fitting
 32. Simplex "Creda Cubana" reflector fire

Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
HERMAN SMITH SMITHLITE, LTD., Empire Works, Dudley, Worcs.	"Flamingo"	Imitation fuel effect	2 kW	Two 1 kW rod	Satin silver	£10 15 6 (coal) £11 10 6 (log)	£1 19 5 (coal) £2 2 2 (log)
	"Swallow"	Imitation fuel effect	2 kW	Two 1 kW rod	Hammered silver	£14 11 6 (coal) £15 7 6 (log)	£2 13 4 (coal) £2 16 3 (log)
	"Albatross"	Imitation log effect	3 kW	Two 1½ kW bar	Hammered shaded grey with chrome treatment	£18 6 0	£3 6 11
	"Eagle"	Imitation log effect	3 kW	Two 1½ kW bar	Shaded grey	£21 0 0	£3 16 9
	"Wren"	Imitation log fire basket	2 kW	Two 1 kW bar	Hammered silver	£12 19 9	£2 7 6
SIMPLEX ELECTRIC CO., LTD., Creda Works, Blythe Bridge, Staffs.	"Cubana" CH.352	Portable reflector	2 kW	Two 1 kW rod	Four two-tone colour schemes	£7 11 4	£1 7 8
	"Cresta" CH.357	Portable reflector	2 kW	Two 1 kW rod	Three two-tone colour schemes	£3 15 3	£0 13 9
SOFONO ELECTRICAL DIVISION OF FEDERATED FOUNDRIES, LTD., 4, Stratford Place, London, W.1. (continued on next page)	"Saturn"	Portable reflector	1 or 2 kW	One or two 1 kW rod	Flame, mocha or pink	£2 16 0 (1 kW) £3 12 6 (2 kW)	£0 10 3 (1 kW) £0 13 3 (2 kW)
	"Saturn"	Portable reflector, adjustable	1 or 2 kW	One or two 1 kW rod	Flame, mocha or pink	£3 16 0 (1 kW) £4 6 0 (2 kW)	£0 13 11 (1 kW) £0 15 9 (2 kW)
	"Jupiter" IRW 75 (a) and IRF 150 (b)	Wall mounting	750 or 1,500 W	One 750 or 1,500 W infra-red spiral	Flame, mocha or grey	£4 15 4 (a) £7 16 5 (b)	£0 17 5 (a) £1 8 7 (b)
	"Jupiter" IRF 75 (a) and IRF 200 (b)	Free standing portable	750 or 2,000 W	One 750 or 2,000 W infra-red spiral	Flame, mocha or grey	£5 16 8 (a) £11 8 3 (b)	£1 1 4 (a) £2 1 9 (b)
	"Spacemaster" PC 101 (a) and PC 202 S (b)	Free standing convector	1 or 2 kW	One or two 1 kW spiral	Duo-tone flame, mocha or gun-metal with cloud grey	£6 0 11 (a) £6 18 8 (b)	£1 2 1 (a) £1 5 4 (b)



33



34



35



36

33. Sofono "Saturn" 2 kW portable fire
 34. Herman Smith Smithlite "Albatross" log-effect fire
 35. Herman Smith Smithlite "Eagle" log-effect fire
 36. "Sofonoflame" infra-red coal-effect fire (Sofono Electrical Division of Federated Foundries)

SOFONO

ELECTRIC HEATERS

The electric heaters that dare to be different!

Everything is new, fresh, exciting and different about Sofono... the range that's fast setting the fashion everywhere. Even one look in your window tells your customers these heaters are way ahead in design and styling.

And look at the advertising campaign behind them... big, hard-hitting spaces in DAILY MIRROR · DAILY EXPRESS · DAILY TELEGRAPH · PEOPLE · SUNDAY EXPRESS · NEWS-OF-THE-WORLD · RADIO TIMES · T.V. TIMES... and NATIONAL TELEVISION ADVERTISING.

In one sweeping advance, Sofono are taking over the electrics market. IT PAYS TO STOCK SOFONO!



SOFONOFAME Infra-Coal and Infra-Log Fires from £15.15.0



SOFONO SPACEMASTER REFLECTOR CONVECTORS from £9.13.0



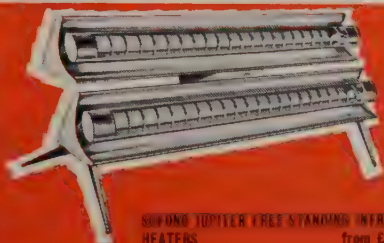
SOFONO SPACEMASTER CONVECTORS from £7.3.0



SOFONO JUPITER WALL-MOUNTED INFRARED HEATERS from £5.12.9



SOFONO SATURN REFLECTOR FIRES from £3.6.1



SOFONO JUPITER FREE-STANDING INFRARED HEATERS from £8.18.0

Stock SOFONO

SURE-FIRE SELLERS!

For details and free supplies of colour booklet, write:



SOFONO ELECTRICAL DIVISION
FEDERATED FOUNDRIES LIMITED • 4 Stratford Place • London

150,000,000

Sales Messages

FROM

dimplex

biggest
ever
backing

in the Sunday Express, Sunday Telegraph, Sunday Times, Sunday Pictorial, The People, News of the World, Scottish Sunday Express, Scottish Sunday Post.

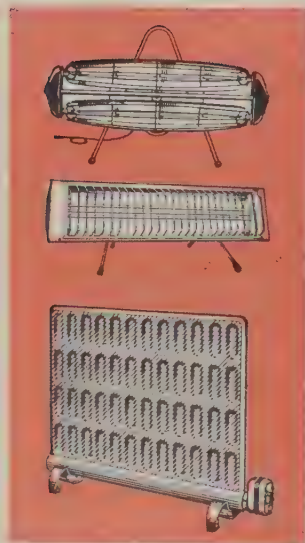
and Ideal Home, Homes & Gardens, Good Housekeeping, Housewife, Woman's Journal, Field, Country Life.

and in hundreds of Evening/Weekly Papers throughout the land.

and big peak viewing time spots on Sunday nights in October and November on all T.V. Stations will make record Dimplex sales for you provided you have acted as follows:—

- Ordered stock.
- Ordered display material and literature.
- Ordered printing blocks (get a copy of our blocks service broadsheet) in order to tie up YOUR Dimplex advertising campaign with OURS.

NOTE THESE NEW FEATURES



Portable infra-red fires —models IRF 750 and IRF 1500 slashed in price. Now from £5 18s. 3d. Tax paid.

New portable infra-red fire model IRF 225 (2½ KW). £7 13s. 9d. Tax paid.

Electric radiators—now with new thermostat, new mountings—which provide plug-in central heating at its wonderful best.

Sell DIMPLEX Today & Everyday

and you will be all set for record sales

DIMPLEX LTD. MILLBROOK, SOUTHAMPTON

Tel: SOUTHAMPTON 74425-9 Grams: HEATEX, SOUTHAMPTON

following last year's immense success



The revolutionary HEAT-LIGHT FITTING providing instant heat and sunshine light in one fitting

The instant success of last year's introduction of the Infralux bathroom heat-light fitting proved the product to be a winner.

This year the Infralux will be introduced on a National basis commencing 15th Sept. — using T.V. in England and Scotland, backed up by national press and periodicals, Women and T.V. Times, T.V. Weekly and T.V. Guide.

Most retailers know the technical details, but to recap, the Infralux provides complete heat and light at the touch of the existing light switch, easily installed, no messy rewiring and is guaranteed for one year

Write for advertising literature and showcards.

- Instantaneous heat and light.
- Perfectly safe — no earthing required.
- Fitted in minutes.
- Controlled by existing light switch.
- Choice of four pastel shades.
- Seamist, Ivory, Havana Pink and Citron Yellow.
- Guaranteed for one year



£4.19.6

INCLUDING TAX

Contact your nearest wholesaler or write direct to Selex Ltd.

'INFRALUX' is unique — it appeals!

MAKE SURE YOU ORDER EARLY AND ENSURE PROMPT DELIVERY

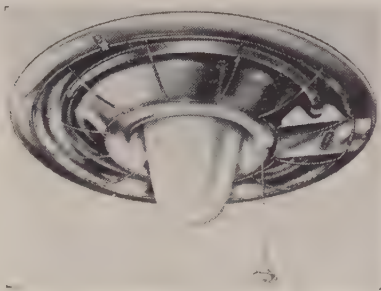
SELEX ELECTRIC CO. (KIRKBY) LTD.

YARDLEY ROAD, KIRKBY INDUSTRIAL ESTATE, LIVERPOOL

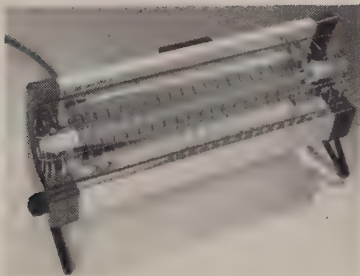


37

- 37. Revo "Regis" coal-effect fire
- 38. Thermadore "Warmwave 50" 500 W infra-red heater
- 39. Thermair Domestic Appliances "Panorama" 2 kW infra-red fire
- 40. Thermair "Heat-n-Lite" combined heating and lighting fitting



40



38



39

Manufacturer or Distributor	Name or Model	Type	Total Loading	Elements	Finish	Price (excl. Tax)	Purchase Tax
SOFONO ELECTRICAL DIVISION OF FEDERATED FOUNDRIES, LTD., 4, Stratford Place, London, W.1. (continued)	"Spacemaster" PC 101 T (a) and PC 202 T (b)	Free standing portable with thermostat	1 or 2 kW	One or two 1 kW spiral	Flame, mocha or gun-metal with cloud grey	£7 0 4 (a) £7 15 7 (b)	£1 5 8 (a) £1 8 5 (b)
	"Spacemaster" PRC 301 S (a) PRC 301 SS (b) PRC 402 ST (c)	Free standing radiant convector	1½ kW (a) and (b) 2½ kW (c)	750 W cone and 1 kW spiral (a) and (b) 750 W cone and 2 kW spiral (c)	Flame, mocha or gun-metal with cloud grey	£8 3 2 (a) £8 7 5 (b) £9 15 4 (c)	£1 9 10 (a) £1 10 7 (b) £1 15 8 (c)
	"Sofonoflame" SFC 150 (a) SFL 150 (b)	Coal effect (a) Log effect (b)	1½ kW	Two 750 W infra-red spiral	Satin black or chocolate	£13 6 4 (a) £13 16 11 (b)	£2 8 8 (a) £2 10 7 (b)
	"Costa Brava"	Portable reflector	1,200 W	Two 600 W rod	Blue	£3 9 6	£0 12 9
	"Monte Carlo"	Portable reflector	1 kW	Two 500 W spiral	Blue and cream	£2 15 0	£0 10 0
R. S. STOKVIS & SONS, LTD., 12/16, High Street, Walton-on-Thames, Surrey.	"Rapallo"	Portable reflector	1 kW	Two 500 W spiral	Hammered bronze	£2 9 1	£0 9 0
	"St. Tropez"	Portable reflector	2 kW	Two 1 kW infra-red	Pale blue or citron	£9 1 7	£1 13 3
	"St. Raphael"	Floor or wall mounting	1 kW	Two 500 W infra-red	Blue or white	£3 17 10	£0 14 2
THERMAIR DOMESTIC APPLIANCES, LTD., Izons Lane, Oldbury Road, West Bromwich.	"Panorama"	Portable infra-red reflector	2 kW	Two 1 kW infra-red	Bronze stoved enamel, chromium trim	£10 2 6	£1 17 0
	"Heat-n-Lite"	Combined lighting and heating ceiling fitting	750 W	One 750 W infra-red	White anodised aluminium reflector	£6 14 10	£1 4 8
THERMADORE (GT. BRITAIN), 94/98, Petty France, London, S.W.1.	"Warmwave" 50	Portable reflector	500 W	One 500 W infra-red	White and grey, black legs	£3 17 4	£0 14 2
	"Warmwave" 77 and 100	Wall mounting	750 W (77) 1 kW (100)	One 750 W (77) or 1 kW (100) infra-red	Dove grey and off-white	£4 11 2 (77) £4 17 6 (100)	£0 16 8 (77) £0 17 10 (100)

Manufacturers of

SILICA GLASS TUBE ELEMENTS

**for infra-red
radiant heaters**

- ★ CARTRIDGE TYPE ELEMENTS
- ★ ASBESTOS WOVEN RESISTANCE MATS AND GRIDS
- ★ MICA WOUND AND METAL CASED STRIP ELEMENTS
- ★ MINERAL EMBEDDED ELEMENTS
- ★ HEATING SPIRALS AND FIRE ELEMENTS

We invite your enquiries

**ELECTRIC ELEMENTS
(WILLENHALL) LTD.**

Spring Lane, Willenhall, Staffs.

Telephone: Willenhall 870

Telegrams: Elements, Willenhall, Staffs

Vital up-to-date facts and figures for the radio and electrical industries

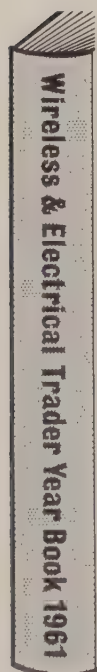
Annual trade directory of the radio and domestic electrical industries, including trade addresses, wholesalers' directory, legal information, rates of pay in the industry, list of proprietary names and classified buyers' guide. Features include television section, specifications of current radio and television receivers, tape recorders and a section devoted to valve base connections and diagrams.

15s. net by post 16s. 8d., 478 pp. from leading booksellers

Published for "Wireless & Electrical Trader" by

ILIFFE Books Ltd.

Dorset House, Stamford Street, London, S.E.1





Backer

RADIANT

BOILING PLATES

- for rapid economical cooking

Telephone: Rotherham 78181 (8 lines)

Telex: 54161

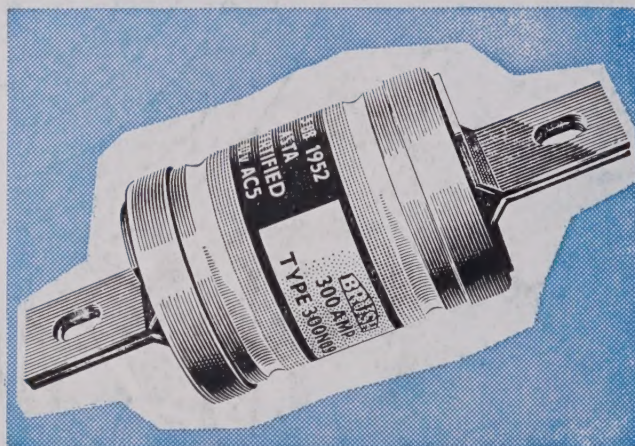
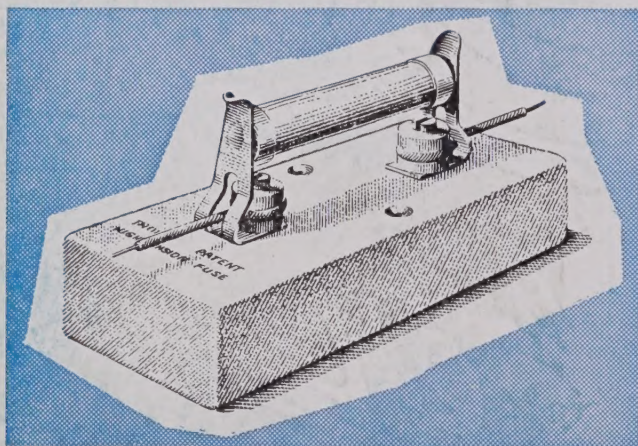
Fuse for thought—



1893



1961



BRUSH CARTRIDGE FUSE-LINKS—

The H.T. fuse above, was invented by a Mr. Mordy and introduced by The Brush Company in 1893. Since that time, as distribution systems expanded, the problem of providing fault protection at low voltage has involved designing a more ingenious device! To-day, high breaking Capacity Fuse-Links by Brush incorporate these advantages:

- * The high speed of operation ensures that heavy fault currents are cut off before peak values are reached and the stresses on equipment are thus reduced to a safe figure.
- * There is no external arc or disturbance during operation and arc voltage rise is restricted.
- * The characteristics of the fuse-links are unaffected by extremely long periods of use at normal current rating due to the careful design of the elements.
- * They are compact and inexpensive and may be used to give protection to existing equipment of low breaking capacity, thus avoiding costly replacement.
- * Deterioration of the fuse element is prevented by complete enclosure.
- * They are accurately calibrated and give reliable discrimination between themselves and with other protective devices.

Brush CARTRIDGE FUSE-LINKS for Industry 2—800 amperes

Inter-service- $\frac{1}{2}$ ampere-150 amperes. Home Service Cut-out 5-100 amperes. The full range A.S.T.A. Certified to BS 88/1952



BRUSH ELECTRICAL ENGINEERING CO. LTD • LOUGHBOROUGH • ENGLAND



A member of the Hawker Siddeley Group

NOTICE

THIS VOLUME IS INCOMPLETE

THE FOLLOWING ISSUES ARE ON ORDER:

Vol.169 No.2-3 1961

NOTICE

THIS FORM IS INCOMPLETE

THE FOLLOWING IS THE ONLY ONE:

BRUSH CUT FUSE LINKS